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KOREA

RURAL INFRASTRUCTURE PROJECT II

STAFF APPRAISAL REPORT

February 10, 1978

Projects Department
East Asia and Pacific Regional Office

CURRENCY EQUIVALENTS

US$1.00	=	Won (W) 485
W 1,000	=	US$2.06
US$1 million	=	W 0.485 billion
W 1 million	=	US$2,062

WEIGHTS AND MEASURES (METRIC SYSTEM)

1 meter (m)	=	3.28 feet (ft)
1 kilometer (km)	=	0.62 miles
1 hectare (ha)	=	2.47 acres
1 million cubic meters (M cu m)	=	810 acre-feet
1 cubic meter per second (cu m/s)	=	35.3 cu ft/s (cusec)
1 ton	=	1,000 kilogram (kg)
	=	2,205 pounds

NOTATION

-- Less than half the smallest unit shown
- Nil or negligible
... Not available separately but included in total
.. Not available
. Not applicable
e Mission estimate

ABBREVIATIONS

ADC	-	Agricultural Development Corporation
cif	-	Cost, insurance and freight
EPB	-	Economic Planning Board
FAO	-	Food and Agriculture Organization of the United Nations
fob	-	Free on board
FLIA	-	Farmland Improvement Association
GNP	-	Gross National Product
GVP	-	Gross Value of Product
HYV	-	High-Yielding Variety
ICB	-	International Competitive Bidding
LCB	-	Local Competitive Bidding
LSH	-	Local Shopping
MAF	-	Ministry of Agriculture and Fisheries
MCM	-	Ministry of Communications
MHA	-	Ministry of Home Affairs
MHSA	-	Ministry of Health and Social Affairs
NACF	-	National Agricultural Cooperative Federation
NAERI	-	National Agricultural Economics Research Institute
O&M	-	Operation and Maintenance
OECF	-	Overseas Economic Cooperation Fund of Japan
ORD	-	Office of Rural Development
OSROK	-	Office of Supply of the Republic of Korea
PMU	-	Project Monitoring Unit
PVC	-	Polyvinylchloride
UNDP	-	United Nations Development Program
USAID	-	United States Agency for International Development
VHF	-	Very High Frequency
WHO	-	World Health Organization

GLOSSARY

Do	-	Province
Gun	-	County
Myon	-	Subdistrict
Ri or Dong	-	Village
Hung Nong Gae	-	"Farmers' Action Group" - Water Users' Association
Saemaeul Undong	-	New Community Movement

FISCAL YEAR

January 1 - December 31

KOREA

APPRAISAL OF THE RURAL INFRASTRUCTURE PROJECT II

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MAP

IBRD 12351R Korea

KOREA

APPRAISAL OF THE RURAL INFRASTRUCTURE PROJECT II

1. INTRODUCTION

1.01 The Government of the Republic of Korea has requested Bank assistance in financing a second multi-sectoral nationwide Rural Infrastructure Project. Bank assistance would allow the pace of development in some rural sectors to be accelerated and, in others, to be maintained in the face of increasing budgetary constraints. The Project has been formulated within the broad program of the Saemaeul Undong (New Community Movement), a national approach to rural development, which affects virtually all public sector investments in the rural areas and which is based largely on decentralized decision-making and self-help from the villagers. Under the project, methods of subproject selection, design and construction developed under the first project would be further improved, and the system of monitoring and evaluation continued. The present project would meet high-priority needs in irrigation, river training, water supplies and rural telephones. Previous related Bank Group investments in Korea include five large-scale irrigation projects, two livestock projects, projects for seeds, agricultural products processing and agricultural credit, and three highway projects.

1.02 The project was identified early in 1977 and prepared by the Government, the work of the various Ministries being coordinated and compiled by the Economic Planning Board. The present report is based on the findings of a preappraisal mission, comprising Messrs. P.W. Whitford, Y. Matoba, L.A. Shanan, M.E. Ruddy (Bank), and C.D. Spangler (consultant), which visited Korea in April 1977 and an appraisal mission, comprising Messrs. P.W. Whitford, Y. Matoba (Bank), N.V. Shenoi, C.D. Spangler and K.A. Sunil (consultants), which visited Korea in August/September 1977. Ms. N.K. Boetker also contributed to the report.

2. BACKGROUND

The Agricultural and Rural Sector

2.01 Issues, objectives and strategy in the agricultural sector are described in the Bank's Economic Report (Reference No. A-1) and are summarized here. Some additional issues related to nonagricultural rural development are also discussed.

2.02 Despite Korea's rapid industrialization during the last 15 years, some 45% of its labor force is still engaged primarily in agriculture, which accounts for 22% of GNP. Population pressure on the 2.3 million ha of available cropland is intense and yields are relatively high. Official statistics show a striking improvement in the incomes of rural households compared to urban wage and salary earner households in recent years. However, rural households are slightly larger and have more workers as compared to average urban households; thus, the official statistics show a disparity in incomes per worker and per capita between the rural and urban

sectors. Moreover, the official statistics on which these comparisons are based suffer from some serious limitations, and other studies suggest that the rural-urban income disparities are still significant, though not large in comparison with other countries. Since the late 1960s, as a result of price incentives, the wider use of higher yielding varieties and cash inputs, and favorable weather, rice production has increased dramatically; Korea achieved self-sufficiency in its staple food crop in 1977.

2.03 In its Fourth Plan (1977-81) the Government aims to complement its basic strategy of a rapid expansion of industrial output and exports with further improvements in the rural sector. The following objectives have been set out:

(a) Rural Incomes. The Fourth Plan aims to improve the balance between incomes in rural and urban areas and thus to retard rural-urban migration. This is to be achieved through increases in off-farm, as well as agricultural, incomes.

(b) Rural Living Standards. As part of its overall social development strategy, the Government aims to increase the availability of social services (such as health, education, housing and utilities) in rural areas, which should also help to slow down migration to urban areas.

(c) Rural Employment. Even with the projected rapid growth in Korea's industrial output, industrial and service employment will do little more than absorb the expected increase in the labor force. Employment in agriculture must therefore be sustained at about its present level, at least for the next five to ten years. Rural employment will also be a useful cushion against cyclical swings in manufacturing. While underemployment is common in rural Korea, this is not so at the peak of the transplanting and harvesting seasons. Some selective mechanization is, therefore, appropriate.

(d) Self-sufficiency. The Government is firmly committed to a policy of self-sufficiency in the major foodgrains. While sufficiency in rice and barley appears sustainable, self-sufficiency in wheat and animal feed grains is only a very distant possibility. The balance of payments impact of imported grains (mainly wheat), while significant in the past, is not likely to be a burden in the future, given the expected rapid growth in Korea's international trade.

2.04 The strategies proposed for attaining these objectives are as follows:

(a) Rural Income Strategy. Up to now, price policy has been an important element of this strategy. Through its control of stockpiles of grain and fertilizer the Government has been able to adjust prices so as to increase rural incomes, while not raising consumer prices unduly. However, in recent years, the Government has recognized the need to reduce the drain on the

budget from these subsidies. The fertilizer subsidy was abolished in December 1975 and the Government is bringing domestic prices for food grains more into line with international levels. Apart from adjustments to overcome short-term fluctuations in world markets, grain prices will probably continue to move towards free market values in the future. Since major improvements in the farmers' terms of trade, therefore, seem unlikely, future increases in rural incomes will have to come largely from improvements in the productivity of land and labor, through land and water development, improvements in the already good extension, research, credit and marketing services, and selective mechanization. Industries in rural areas will also provide additional off-farm income.

(b) Rural Living Standards Strategy. As a result of the income-generating activities just described, the demand for increased consumption and improved living standards will rise. Availability of consumer goods is not likely to be a problem. The Government's role will be to provide those public services which it is uniquely fitted to provide - education, health services, transport facilities, water supply, rural electrification, telephones and housing finance. Because of the increasing demands on budgetary resources, the Government is successfully mobilizing impressive amounts of self-help from the beneficiaries of these programs under the New Community (Saemaeul) Movement.

(c) Rural Employment Strategy. Employment in rural Korea can be sustained and underemployment reduced through a balanced program of land and water development, Saemaeul rural development activities, selective mechanization, and rural industrialization. The Government is also encouraging workers employed in towns and cities to continue to live in rural areas through improvements to transport and communication facilities. Agricultural job creation is not in itself a major policy objective, as demographic projections show that agricultural underemployment will be of declining importance after the mid-1980s.

(d) Self-sufficiency Strategy. The strategy outlined for raising rural incomes will also tend to increase self-sufficiency in foodstuffs, particularly grains, fruits, and vegetables (and possibly lead to significant exports of processed and specialty foods). As incomes rise, demand for a more nutritious and varied diet is bound to increase. Additional measures will be needed to influence the mix of production, beginning with research (for example, on wheat varieties which could be double-cropped with rice) and including specially focused efforts in credit, extension, marketing and processing.

2.05 There is a well-developed consensus in Korea on the importance of the above strategies and a clear chain of command from the Economic Planning Board to the Ministries and, thence, to the Government corporations, cooperative federations and provincial and county administrations, which implement the projects needed to achieve them. Detailed quantitative targets have been

set under the Fourth Plan and prospects for their achievement are good. Sector knowledge is generally good, though further work is needed in areas such as credit and marketing, livestock development, rural industrialization and the appropriate development strategy for existing upland crop areas.

Government Policy and Bank Lending Strategy

2.06 There is a close harmony of views between the Bank and the Government on the overall objectives and strategies proposed for the rural sector under the Fourth Plan. While views differ somewhat on the relative emphasis to be given to various types of investment and on the technical design of some projects, such differences are not profound and are likely to be resolved with further dialogue and analysis.

2.07 The Bank has been and should continue to be involved in most aspects of Korea's rural development. The Bank so far has not been significantly involved in rural industrialization but studies now under way may suggest lending opportunities in this subsector. The other rural development activities may be classified as follows:

(a) land and water development;
(b) rural infrastructure; and
(c) agricultural supporting services.

2.08 Land and Water Development may be divided into two categories (though individual projects may contain elements of both): investments to increase the cultivable area and investments to increase the productivity of existing cropland. Under the first category, tideland reclamation and upland reclamation are the two major programs. While both types of development yield high benefits in terms of incremental production, the unit costs of tideland reclamation are so high that it is likely to be limited by economic feasibility and budgetary constraints. The attractive economic returns likely from upland reclamation must be balanced by the technical problems of erosion and crop suitability, the solutions to which require further field testing before such projects can be developed on a large scale. Techniques for improving the productivity of existing cropland may be classified according to the existing land use. Paddy land can be made more productive by new or improved irrigation, land consolidation, drainage, river training and the provision of farm and feeder roads. Existing upland areas can be either converted to paddy land (requiring the concurrent provision of irrigation, in most cases) or upgraded through a package of engineering improvements and supporting services. Finally, forest land (most of which is privately owned in small lots) can be made more productive in terms of fuelwood, pulpwood, saw logs and other forest products.

2.09 Rural Infrastructure activities may range from micro-scale improvements to village drains and roofs to fairly sophisticated large-scale utility or irrigation projects (the latter also fall into the Land and Water Development category). Since 1971, Korea has undertaken a massive program of rural infrastructure works under the Saemaeul Movement. This movement has gradually broadened to include most rural (and some urban) development activities but has retained two essential features: decentralized decision making, including the particiation of the beneficiaries; and self-help,

either through volunteer labor, a cash contribution or cost recovery charges. Besides creating physical infrastructure and employment opportunities, the Saemaeul Movement puts a heavy emphasis on institutional building, especially the development of self-reliance. Villages are classified as basic, self-help or self-reliant, according to their ability to execute and finance projects. These classifications are reviewed annually, according to a points score system. Projects are selected by the village and reviewed by a hierarchy of Government committees. The degree of Government technical and financial assistance varies according to the classification of the village. Since 1971, the equivalent of $1.8 billion has been invested in Saemaeul activities, of which the Government contribution was less than half. Projects carried out range from simple improvements to village drains and roofs, roads, water supply, up to more sophisticated rural electrification and irrigation schemes, livestock raising and rural industries.

2.10 Agricultural Supporting Services are well developed in Korea and are generally meeting the needs of the farmers. Improvements are needed mainly in extension, credit and marketing for special crops and livestock.

2.11 Bank financing in the rural sector was first directed at land and water development (five projects for irrigation, including tideland reclamation). In recent years, the Bank has helped finance four projects to improve agricultural industries and support services, such as the supply of seeds and credit for special crops, livestock and food processing. The Bank has also helped finance the Rural Infrastructure Project I which includes land and water development components (irrigation, upland and reclamation and fuelwood), infrastructure components (roads and bridges, water supply and rural electrification), and some assistance to support services (extension, soil conservation, fuelwood research and hydrology).

2.12 Bank projects for the next few years will continue to assist all three areas and are likely to broaden to include a marketing project and possibly assistance to rural industrialization. The proposed lending program would further the objective of improving the distribution of income within the rural sector and between rural and urban areas, though it must be borne in mind that income distribution in Korea is already remarkably even. Only 14% of the rural population are classified as being below the poverty income level (US$200 per capita) for the rural areas. The rural poor are a dispersed and not well defined group and it would be difficult to design projects to benefit predominantly such a "target group". The real challenge for the future will be to keep labor productivity in agriculture from lagging too far behind that in industry, to prevent a growing disparity between rural and urban incomes. In that sense, agricultural and rural development projects should be geared to meeting the national objective of more equitable income distribution.

Rural Conditions in Korea

2.13 The average farm size in Korea is about 0.9 ha, of which 0.5 ha is paddy land (para. 2.15), while the remainder grows upland crops, such as barley, maize, soybeans, fruit, vegetables, tobacco, mulberries (for silkworm

production) and other cash crops. Nearly two thirds of farm households have less than 1 ha of cropland but only 5% of farm households are landless. The national farm size distribution is given below:

Table 2.1: FARM SIZE DISTRIBUTION

	Percent of farm households	Percent of area
Landless	4.7	-
Up to 1 ha	62.2	38.2
1 to 3 ha	31.5	54.6
Over 3 ha	1.6	7.2
	100.0	100.0

Most farmers own the land they cultivate, 70% being full owners and a further 23% renting some land they cultivate, in addition to their own. This equitable distribution of land ownership is the result of the Farmland Reform Laws of 1945 and 1950, which imposed a ceiling of 3 ha of cultivated land per household.

2.14 All uncultivated land in Korea (about 67% of the total area) is classified as forest but most high-grade timber production comes from the 840,000 ha (9%) of national forests. Most of the remaining "forest" is privately owned in small holdings. Private forest land is used mostly for the gathering of fuelwood and its productivity is very low.

2.15 Rice and barley are the major crops, accounting for two thirds of the total crop area and they are grown throughout the country, with a concentration in the western and southern coastal areas. Due to climatic constraints, double cropping of rice is not possible in Korea but a rice-barley rotation is practiced in the southern regions and now occurs on about 45% of the total paddy land. With the advent of earlier-maturing varieties and improvements to management and infrastructure, double cropping is increasing and may eventually reach 70% of all paddy land. Rice yields in Korea are much higher than those in South and Southeast Asia, reflecting a high level of input use and good management. However, even though the average national rice yield (on a milled basis) reached 4.3 ton/ha in 1976, yields are still 20% below those in Japan, indicating a margin for improvement. High-yielding varieties (HYVs) of rice were introduced in 1971 and now account for 43% of paddy area. The Government's plans call for HYV coverage to reach 70% by 1980. The main constraints on national food grain production are water control (irrigation and drainage), varietal improvement (mainly of barley) and, to a lesser extent, access to markets. Further details are given in Reference A-6.

2.16 Other food crops, soybeans and other pulses, potatoes and miscellaneous cereals, are grown mainly in upland areas and account for about 18%

of the cropped area. Over the last decade, production of most of these crops has stagnated or declined, due to the conversion of upland to paddy (in response to a Government price policy which gives a strong incentive to rice production), partial abandonment of some poorly developed upland areas and possibly other factors. Upland development on a wide scale is a fairly recent phenomenon in Korea and is a response to greatly intensified population pressure on the land resource since the Korean War. Recent surveys estimate that a further 135,000 to 200,000 ha of forest land could be economically converted to cropland, compared with an existing total upland area of 1.0 million ha.

2.17 Fruit, vegetables, tobacco and ginseng are high-value crops, accounting for 11% of land area but almost one quarter of crop value. Only small areas are used to grow maize and other feed crops. Livestock depend on crop residues, grazing of wastelands, rice bran and imported feeds. Cattle, which number 1.8 million, are kept mainly for draft purposes and one million families own one or more animals. Mechanization is expected to accelerate over the next five years with the addition of about 50,000 power tillers to the existing fleet of 100,000.

2.18 The settlement pattern in Korea reflects topographic and historical realities. As 70% of the country is mountainous, settlements mostly occur in the valleys and coastal plains. Frequent wars and invasions have led to a pattern of clustered villages, each house having a courtyard and a single entrance gate. Korea has also undergone rapid urbanization in the last two decades, with Seoul and Busan now accounting for 23% of total population. At the other end of the scale, one finds the remote settlements of the mountainous Northeast and the undulating coastal region of the Southwest characterized by smaller, more isolated and poorer villages. Nevertheless, while differences between rural regions are noticeable, the major disparity in living standards is between urban and rural areas.

2.19 Korea has a fairly well developed major transport network, with railways, expressways and paved two-lane highways connecting the provincial capitals and the major towns. On the other hand, the provincial and county road network, while generally adequate in terms of density and location, is generally badly surfaced and inadequately maintained, leading to excessive operating costs. Also important is the fact that many villages do not have vehicular access to the county road network. In 1969, a total of 46,000 km of village roads and 1,800 bridges were identified as being needed to give adequate access to all villages. Since then, 34,000 km of roads and 1,500 bridges have been constructed under the Saemaeul Movement.

2.20 The average rural household income in Korea is now about US$2,400 per year (of which about 82% is received from agriculture) and the resulting increase in living standards has created a demand for urban-type services, such as electricity, water supply, postal services and access to telephones (in approximately that order). The Government has recognized that services of this kind are important in discouraging rural-urban drift (which has been as strong in Korea as elsewhere in Asia, though perhaps with less damaging consequences due to industry's ability to absorb labor) and has responded with a massive program of rural electrification and more modest programs for

the other services. Electricity is now available to 90% of rural households, compared to 95% in the cities. The status of water supply and telephone service in rural areas is described in paras. 4.17 and 4.23.

The First Stage Project

2.21 The Rural Infrastructure Project I, which began early in 1976 and is partly financed by Loans 1216-KO and 1218T-KO, comprises six main components. Minor Irrigation includes 61 subprojects totalling 12,700 ha of irrigable area. Nineteen subprojects have now been completed and the whole program is expected to be completed by June 1979. Upland Reclamation consists of about 48 subprojects covering the conversion of 4,500 ha of forest land to new cropland and also has a heavy applied research emphasis, aimed at improving design standards and gaining a better understanding of soil conservation techniques. As a result of some design and budgetary problems, now resolved, the component was only one-third completed at the end of 1977 but should be completed in 1978. The Fuelwood component, now finished, has established 127,000 ha of new plantations at 11,990 sites and has a small research element. A satisfactory survival rate of 91% has been achieved. The Roads and Bridges component, also complete, consists of 860 km of village access roads and 211 bridges (up to 50 m long). Under the Water Supply component, the revised project target of 4,073 villages (double the appraisal estimate) have been supplied with piped water, benefiting a total of 360,000 households. The Rural Electrification component has benefited a similar number of households, through 3,813 subprojects, and is now completed.

2.22 The Minor Irrigation, Upland Reclamation and Rural Electrification components have been planned primarily at the central level and have been executed by contract, with additional support from the beneficiaries and a reasonably high level of cost recovery. The remaining components have been executed primarily by volunteer labor, using materials supplied by the Government, with a correspondingly lower level of cost recovery.

2.23 Project implementation is proceeding very satisfactorily and only the Minor Irrigation and Upland Reclamation components, which have been delayed by some design problems and budgetary shortages, remain to be completed. The quality of completed works is fully satisfactory. The final cost of the project is likely to be about 16% above the appraisal estimate, mainly the result of delays and cost increases in the Minor Irrigation and Rural Electrification components. However, economic rates of return for the various components are expected to be satisfactory. More than 80% of the loans, which total US$60 million, has been disbursed.

2.24 The First Stage project also provides for a hierarchical system of reporting and monitoring and for a series of evaluation studies. As these elements would be continued under the proposed project, they are described in greater detail in Chapter 5.

Project Formulation

2.25 The proposed project is directly based on the First Stage Project, just described. At the beginning of 1977, the Government proposed to the

Bank that a follow-up project be prepared for Bank consideration. Project preparation work, mainly by the Ministries responsible for the proposed components, is now virtually completed (Annex 4).

2.26 The proposed project would be nationwide in scope and would be aimed mainly at the following sector objectives: increasing rural incomes; improving rural living standards; and maintaining rural employment. The project would also have a minor impact on the Government's fourth objective: self-sufficiency in food grains. The proposed Irrigation and River Training components would mainly affect rural incomes, while the Water Supply component would aim at improving rural living standards. The Rural Telephones component would affect both incomes and living standards. All components would have a modest impact on both short-term and long-term employment. The project would also help to sustain the decentralized decision-making and self-help features of the Saemaeul Movement (Chapter 3) and would tend to benefit the more backward and isolated villages.

2.27 Bank assistance to the project would allow the accelerated implementation of four programs, to which the Government already attaches high priority (the programs would continue, at a slower pace, without Bank involvement). Bank involvement is also expected to lead to improvements in subproject selection procedures, modest improvements in design and implementation methodology (which are already good) and more systematic monitoring and financial management. The evaluation studies, begun under Stage I and to be continued under the proposed project, are the first comprehensive studies of the impact of government investments on rural development in Korea.

2.28 In formulating the project, the major challenge has been to meet the policies, administrative procedures and appraisal standards of the Bank while causing minimal disruption to the Government's multi-sectoral, decentralized, evolving and yet efficient approach to rural development. In the detailed formulation and appraisal of the project, every effort has been made to work through the existing administrative structures wherever possible, to support self-help and institution-building at the village level, and to use conventional Bank procedures in a flexible way to accommodate a unique project.

2.29 Two of the sectors chosen for inclusion in the project (Irrigation and Water Supply) will continue programs assisted under the First Stage Project and, in these sectors, there is a large and continuing need for further investment and external assistance. Of the other sectors included in Stage I, the Fuelwood and Rural Electrification programs are now virtually completed nationwide, while the Government has decided to complete the Village Roads and Bridges program without external assistance. The remaining component, Upland Reclamation, has not yet reached a sufficient degree of completion for a follow-up project to be appraised. The new sectors to be assisted by the proposed project (River Training and Rural Telephones) were chosen because of their high priority within the Government's rural development planning, the Bank's familiarity with and expertise in these sectors, their clear economic and social benefits and their complementarity to the other continuing programs.

3. THE SAEMAEUL MOVEMENT

Origins and Goals

3.01 The proposed project would fit within the framework of the Saemaeul Undong (New Community Movement), which was initiated late in 1971 as a nationwide comprehensive self-help program to improve living conditions in rural areas, achieve greater decentralized economic growth, and slow the influx of rural people to the large metropolitan centers. The Movement is a successor to the "Self-Help Works Program" (1964-1972) which in turn was based on the "National Construction Service" (1961-1964). These programs were relatively modest in scope (US$10 to 20 million per year) and were financed from counterpart funds generated by the sale of foodstuffs provided by USAID under PL 480. Needy rural people were employed, mainly on upland reclamation, tideland reclamation, irrigation, flood control, reforestation and road projects, and were paid partly in cash and partly in food.

3.02 The Saemaeul Movement (described in more detail in Reference B-2) is broader in scope than these earlier efforts and includes a greater degree of self-help and decentralized decision-making. It has three main objectives:

(a) physical and environmental improvements by cooperative group action;

(b) increased productivity and incomes, principally by creating more non-agricultural jobs in rural areas but also by raising agricultural productive capacity through more effective use of land and water resources; and

(c) "spiritual enlightenment," that is, the fostering of a spirit of diligence, cooperation and self-help, the replacement of traditional fatalism with a future-orientation and the development of leadership and entrepreneurial skills.

3.03 Besides creating physical infrastructure and employment opportunities, the Saemaeul Movement puts a heavy emphasis on institution building. The main goal is to develop self-reliance, that is, the capacity of villagers to program, finance, and execute a range of developmental activities with a minimum of outside assistance. The emphasis on self-reliance is reflected in the following classification of villages, used to determine the degree of government assistance:

(a) Basic Villages. These lack organization and leadership as well as the resources required to carry out community improvement projects and therefore require guidance, as well as financial assistance, from the Government.

(b) Self-Help Villages. These have acquired sufficient leadership and organizational ability to identify and carry out development projects but lack the full financial resources to implement them and require some government technical and financial support.

(c) Self-Reliant Villages. These have carried out a number of projects and achieved some degree of financial self-sufficiency allowing them to finance additional projects from their own resources or from loans.

3.04 The classification of villages is at least partly quantitative. Such factors as past and current achievements under the Saemaeul Movement, the physical condition of the village, income levels and the size of the village development fund, are being used to calculate an annual score, which determines the classification of the village each year. Annex 2, Table 1 shows the numbers of villages in each group at present. About 60% of villages fall in the "self-help" category. The Government expects that, as the Saemaeul Movement continues, villages will move from one category to the next and official planning shows all villages in the "self-reliant" category by 1981. While there are no hard and fast rules as to the types of projects to be undertaken by each category of villages, the pattern seems to be that "basic" villages undertake only simple environmental improvements, such as roof improvements, drains, communal laundries and community halls. Such projects are low in cost and may have only a limited economic impact but they do serve to train the village leaders and to build a sense of community and achievement. Self-help villages are expected to concentrate on infrastructural projects, such as rural roads, bridges, minor irrigation systems, water supplies, telephones and electrification. Most such projects have a subsidy element but self-help, either in the form of communal labor, or a loan obligation, is still significant. Finally, the "self-reliant" villages undertake directly productive, or "income," projects such as livestock raising, silk production, specialty crops and cottage industries. These projects are normally financed by credit, with little if any subsidy element.

3.05 While there are regional variations of income in Korea, these are relatively small and there are no clearly defined large depressed areas. Reasons for this include the compact size of the country, the mobility of the labor force, the high rate of literacy throughout the country and the equitable farm size distribution (para. 2.13). There is no sharp distinction between subsistence and commercial agriculture and, as a result, new techniques and attitudes have diffused fairly quickly. Nevertheless, there are many small localities, scattered throughout Korea, where poor transport and a lack of services such as irrigation, electricity and water supply are constraining development. For these reasons, the Saemaeul Movement is nationwide but concentrates on the less-developed villages, which tend to be in the more remote parts of each region. For the same reasons, the proposed project would be national in scope with an emphasis on basic and self-help villages.

Organization of Saemaeul Activities

3.06 At the national level, general policy issues for the Saemaeul Movement are dealt with by a Vice-Ministerial Coordinating Committee, chaired by the Minister of Home Affairs, and with representatives from all Ministries dealing with Saemaeul activities. A Saemaeul Coordinating Committee of senior officials from each Ministry translates these general policy directives into sectoral targets and planning guidelines for the Ministries. Saemaeul

activities are channeled through the existing government agencies and are subject to the normal technical review and budgetary approval procedures. There are also Saemaeul Coordinating Committees, consisting of representatives from all the government agencies concerned, at the provincial, county and subdistrict levels. These committees receive requests from the level below and allocate funds to the highest priority projects, within the overall guidelines set by each Ministry. In many cases, funds are allocated between provinces (and thence between counties, and so on) in proportion to the volume of work remaining to complete the coverage of a particular service or to reach a nationwide target level.

3.07 The Ministry of Home Affairs (MHA) is responsible for fostering the Saemaeul Movement, for training its leaders, and for administering many of the more basic kinds of projects. These units include the Saemaeul Projects Bureau at the Central Government level, Saemaeul Guidance Sections in the provincial administrations and smaller units at the county and subdistrict levels. Each county has a technical guidance team of about five members to assist villages in the design and supervision of roads, water supplies, river training subprojects, buildings and other technical activities.

3.08 At the village level, each village has a Saemaeul Committee of about 15 members, elected by the villagers. At meetings of the committee, community needs and objectives are discussed. Each village elects a Saemaeul leader, who presides at Saemaeul Committee meetings and assigns work on self-help projects. It also elects a woman leader, who encourages the participation of women in household improvement projects. In most villages, the Saemaeul leader is not the village chief, who is appointed directly by the provincial government, but is a younger man with above-average education or skills.

Subproject Selection

3.09 After the village decides on its priorities, it submits a request to the subdistrict Saemaeul committee (para. 3.06) and thence to the county committee. These committees examine the technical feasibility of the request, for which they rely on the advice of the government agency concerned, and the suitability of the proposed project for the state of development of the requesting village (para. 3.04). The past record of the village and its willingness to contribute cash or labor to the project are also taken into account.

3.10 Within the village, decisions are reached by majority rule. Minority opposition is generally overcome by persuasion and the available evidence indicates that few, if any, villagers refuse to participate in the selected projects. The well-disciplined Korean social structure and the country's Confucian heritage appear to facilitate this lack of dissension. While it would be difficult to believe that project initiation is always at the grass-roots level and that participation is completely voluntary, there is no denying the obvious enthusiasm of the villagers for the Saemaeul Movement and the great amount of work that has already been completed. In nearly all cases, the projects selected appear to be appropriate to the needs of the village.

Scope and Achievements of the Saemaeul Movement

3.11 The geographical and sectoral scope of the Saemaeul Movement has evolved and expanded since 1971. Initially conceived of as a self-help program for rural areas, it has grown to include projects carried out with hired workers and to encompass urban areas. The main thrust of the Saemaeul Movement remains nevertheless directed toward rural areas (particularly the more backward and isolated villages) and agriculturally-related activities. The national breakdown of Saemaeul activities by sector has changed from year to year, reflecting the influence of three main factors:

(a) the development priorities of the Government;

(b) the number of villages in each Saemaeul category; and

(c) the maturing organizational structure (at the government and village levels) and improving project selection procedures.

3.12 Due to the changing nature of the Saemaeul Movement and its emphasis on decentralized decision-making, small-scale projects and self-help, determination of the total investment in and the physical achievements of the Saemaeul Movement is difficult. Available data are summarized in Annex 1. According to official figures, a total of W 893 billion (approximately US$1.84 billion) was invested in Saemaeul projects between October 1971 and December 1976 with W 323 billion in 1976 alone. It is worth noting that only 48% of the total investment was provided by the central and local government budgets. However, this percentage is rising, as more sophisticated projects are tackled. The remaining 52% was contributed by the villagers, in labor or cash. Of this, the most important component was their labor input - 65% of the villagers' contribution.

3.13 The physical achievements of the Saemaeul Movement up to 1976 include 34,000 km of village roads, 15,000 village water supply projects, 5,900 km of river training, 213,000 ha of reforestation, 2.3 million households electrified and 474 Saemaeul factories. It is worth stressing that physical construction is only one objective of the Saemaeul Movement - institution building and the development of self-reliance are equally important, though more difficult to measure.

4. PROJECT COMPONENTS, COSTS AND FINANCING

4.01 The principal features of the project are summarized below:

Part A - Irrigation Component - construction of about 61 subprojects with a net irrigable area of about 9,200 ha;

Part B - River Training Component - construction of about 2,500 km of levee banks along small rivers and streams;

Part C - Water Supply Component - provision of simple piped water supplies in about 7,400 villages; and

Part D - Rural Telephones Component - connection of about 2,700 villages to the telephone network and provision of 75,000 additional subscribers' lines in the subdistrict towns plus a pilot project for future rural telephone development.

The project also provides for technical training and for the monitoring and evaluation of the investment program and the Saemaeul Movement generally. The project components are described in more detail below.

Irrigation Component (US$81.8 million)

4.02 Background. The development of irrigation has played and will continue to play a major role in the expansion of rice production during the summer season and of barley as a winter crop. In 1962, the total irrigated area was 660,000 ha or 53% of the total paddy area. Since 1962, an average of about 30,000 ha per year has been put under irrigation and the irrigated area is now 1,070,000 ha or 84% of all paddy land, according to the Fourth Five-Year Plan. However, not all irrigated areas have adequate water supplies. During the Plan period, the Government plans to increase the irrigation ratio to 94% in 1981.

4.03 Irrigation Program. Irrigation development includes small (less than 50 ha), medium (50 to 1,000 ha) and large (greater than 1,000 ha) projects. Small projects are numerous but do not account for a very large proportion of investment. They are carried out under provincial supervision under the Saemaeul Movement. Large projects came into prominence in the late 1960s and since then have dominated the picture - most have been financed by the Bank or other external agencies. However, in recent years the Government has begun again to give attention to medium-scale projects, including the proposed component. For example, expenditure in 1978 on such projects will total about US$70 million. Apart from Bank assistance under Rural Infrastructure I for 61 subprojects, the Government is also engaged in a similar program financed by OECF and one commenced with USAID assistance but being completed with Government funds. There are also a few entirely domestically funded projects.

4.04 Project Works. The Irrigation component would comprise about 61 subprojects, with a net irrigable area of 9,200 ha, and would be located

in all provinces of Korea (except Jeju). The proposed subproject list and its provincial distribution are given in Working Paper C-1. The subprojects would include the water source (reservoir or pumping station), main and lateral canals and land leveling of areas converted to paddies. The benefited area would include 6,500 ha of paddy land, rainfed or partly irrigated at present, and 2,700 ha of cultivated upland or forest, which would be converted to irrigated paddy land. About 46 subprojects covering 6,700 ha would depend on reservoirs created by small or medium sized earth dams. Embankment volumes would range from 30,000 to 300,000 cu m and the live storage of the reservoirs from 250,000 cu m to 3,300,000 cu m. These dams would generally have a central core of selected impervious materials, shells of unselected alluvial materials (owing to the high cost of crushed rock) filter zones and drains where required, an overflow or side channel spillway on one abutment and a gated pipe outlet. In most cases, a cut-off trench to sound rock and a grout curtain of at least one-third of the static head would be provided. The remaining 15 subprojects are located near major rivers and would be supplied from pumping stations. Electrically-driven pumps would range from 25 to 450 hp with lifts of 5 m to 40 m. Some subprojects located near large rivers are protected by levee banks and some of these subprojects would require drainage pumping stations. About 415 km of main and 72 km of lateral canals would be constructed as part of the project. In most cases, these would be unlined gravity canals but, in many cases, concrete lining, flumes and tunnels are used to avoid excessive land acquisition or to ensure structural stability. In such cases, individual cost comparisons between alternative designs are made. Wherever upland or forest areas with slopes less than 15% and with soils suitable for paddy cultivation are included in the commandable area of a subproject, these would be terraced for paddy cultivation under the project. Fine leveling and tertiary ditches would be left to the farmers themselves and there is ample evidence that, under Korean conditions, this is feasible. The subprojects would not, in most cases, include land consolidation, as this is generally not a high priority for the small, compact subproject areas and its omission would allow a greater area to be irrigated with available funds. Experience under the Stage I Project has been taken into account in formulating design standards and construction methods for the component.

4.05 Subproject Selection. Subprojects to be included in the component have now been selected, in consultation with the Bank, using both technical and economic criteria. The following technical criteria (which are based on a UNDP Watershed Development Project) were used for reservoir subprojects:

(a) the benefit area of the subproject should be greater than 50 ha but less than 700 ha (to take advantage of economies of scale, while maintaining a reasonably short implementation period);

(b) the height of the earth dam should be less than 30 m (so that ADC's design procedures could be used without elaborate feasibility studies);

(c) the ratio of the catchment area to the irrigated area should be at least 2.2:1 (to ensure that the reservoir will fill);

(d) the reservoir live storage should be at least 3,500 cu m/ha of irrigable land (to meet the expected irrigation demand); and

(e) the ratio of the reservoir live storage to the embankment volume should be at least 4:1 (to ensure a reasonable standard of storage efficiency).

It should be emphasized that these limits are not design criteria. Subprojects are being designed according to the standards described below. However, these methods, being standardized, sometimes lead to anomalous results and the above limits are intended to strengthen the assurance that the water supply for each subproject will be adequate and reliable. On the economic side, each subproject must have a rate of return of at least 11% (Chapter 7).

4.06 Status of Design. In 1968, the Agricultural Development Corporation (ADC) identified about 4,000 potential small and medium-scale irrigation projects, from which the present subprojects have been selected. Following the identification stage, topographical, geological, hydrological and cadastral surveys are made and the detailed design prepared. Determination of the required reservoir volume and the spillway capacity is carried out by rainfall-runoff correlation methods and a variant of the Rational Method, respectively, which are adequate for small projects but which would be refined when results from the Hydrologic Services Study, financed under Stage I, become available. The structural and hydraulic design of dams, spillways, pumping stations and canals follows well-known, internationally accepted methods, which are satisfactory. ADC has its own geotechnical engineers and has successfully designed and constructed several hundred small dams in the last 20 years. As of December 1977, 19 subprojects had been designed and all subprojects are expected to be designed before the end of 1978.

4.07 Construction Methods. The irrigation subprojects would be constructed generally by machine-intensive techniques but considerable amounts of labor would be used for trimming abutments, concrete and masonry works, sodding and canal digging. The upgrading of construction techniques begun under Stage I would continue to ensure more efficient and economical construction. Coffer dams and diversion tunnels or conduits would be used, quality control of concrete would be improved and the contractors would be given greater flexibility in scheduling their activities so as to minimize rehandling of materials.

4.08 Construction Schedule. Because of heavy budgetary and manpower commitments in 1978 for the completion of the Stage I Minor Irrigation component and other projects, the Government is not able to begin the bulk of the irrigation subprojects until 1979. However, about 15 of the larger subprojects for which designs have been, or will soon be, completed, would commence in July 1978. The implementation period would be about three years for a dam subproject and about two years for a pumping station subproject. This fairly lengthy schedule takes into account the severe winter, the annual budgetary cycle and the fairly constricted work sites. Dams would be scheduled so that filling would begin late in the calendar year, so as to be ready

for the next year's irrigation season. Pumping stations would be scheduled for completion before June so as to be put into operation immediately. The component would be completed by June 1982.

4.09 Unit Costs. In terms of 1978 prices, reservoir subprojects are estimated to cost US$9,600/ha and pumping stations US$6,200/ha plus contingencies. These unit costs are certainly at the upper end of the acceptable range for rice irrigation. Irrigation costs in Korea are rising faster than general price levels, possibly because of the large proportion of costs attributable to land acquisition and labor. Land prices are rising rapidly because of the extreme shortage of land in Korea, while wages have risen faster than consumer prices as a result of government policy to give wage earners an equitable share in Korea's rapid economic growth. Irrigation costs in Korea have always been high compared with Southeast Asia (though not with Japan), because of the relatively small scale of the feasible projects, the need for an intensive layout to serve the very small farms, the irregular topography which necessitates large numbers of flumes and tunnels, and because of the impossibility of constructing reservoirs without inundating valuable farmland. However, irrigation costs per beneficiary family (US$3,460 for reservoirs and US$2,200 for pumping stations) are somewhat lower than the average for irrigation projects in the East Asia region. The high unit costs per ha do not therefore affect the favorable distributional and equity effects of the component.

4.10 Environmental Effects and Dam Safety. Apart from possible soil erosion during construction, the supplying of irrigation water to existing paddy land and upland areas should have minimal environmental effects. Schistosomiasis is not present in Korea. To ensure the safety of the dams to be constructed under the project, an assurance has been obtained that the Borrower would, under arrangements satisfactory to the Bank, cause the dams constructed under the project to be periodically inspected in accordance with sound engineering practice in order to determine whether there are any deficiencies in the condition of such structures, or in the quality and adequacy of maintenance or methods of operations of the same, which may endanger their safety. To this end, the Borrower shall propose to the Bank appropriate arrangements for the Bank's review no later than one year before the expected completion of such structures (Section 4.07 of the Loan Agreement). As ADC staff do not at present have any specialized training in dam safety inspections, funds would be provided under the project (para. 5.06) for a small group of staff to receive such training.

River Training Component (US$37.5 million)

4.11 Background. Rivers in Korea are generally short but highly variable in their flow. Flooding is common and sediment loads are also high. Flood damage may take several forms, the most common being inundation damage to crops and homes. Bank collapse, which destroys farmland, and the spreading of coarse sediment over productive and valuable farmland are also important. Freedom from frequent flooding is a prerequisite for irrigation development and more intensive agriculture generally. The Ministry of Home Affairs (MHA) has made a complete inventory of all streams in Korea greater

than 2 m in width. Basic data on each stream are recorded and a classification according to width is made. Streams 2 m to 5 m in width are under the jurisdiction of the village, those 5 m to 10 m in width are under the subdistrict, and those 10 m to 20 m in width are under the county. These categories are denoted as Classes I, II and III. Larger rivers, which are managed by the Provincial or Central Governments, are outside the scope of the project.

4.12 River Training Program. For a variety of physical and economic reasons, flood damage mitigation is generally achieved through river training (levee bank construction), rather than by reservoir construction in Korea. These levee banks contain flood flows, prevent the deposition of sediment and prevent the river from widening or meandering. From the inventory of Class I, II and III streams, 17,239 km (of the total length of 39,110 km) have been identified as requiring bank protection and 6,095 km of this total was completed by the end of 1977. The government objective is to complete the protection of all vulnerable reaches by 1981 but this target appears somewhat over-ambitious, given the rather modest accomplishments of recent years.

4.13 Project Works. The River Training component of the project would consist of the construction or improvement of 2,500 km of river banks, 1,250 km in each of 1978 and 1979. Of this total, 1,250 km would benefit Class I streams, while 750 km and 500 km are the estimates for Classes II and III, respectively. Subprojects may include both banks or only one bank, depending on priorities, and generally terminate at an existing bank or on high ground. As the average length of a subproject is about 300 m, the program would consist of about 8,300 subprojects. Based on the 1977 program, about 93% of the subprojects would require an earth embankment, 79% grass sodding, 32% grouted stone protection, 24% dry stone pitching and 17% gabions (wire baskets filled with boulders). As the above figures indicate, combinations of methods are frequently used. The selection of methods is generally based on physical considerations, such as the width of the stream, its velocity and curvature. These criteria are generally appropriate but greater use would be made of gabions under the project because of their greater stability during floods. Efforts would also be made to compare the stability and durability of alternative forms of construction. A typical subproject would thus consist of an earth embankment about 2 m high (sometimes with a road along the top) with some form of protection on the stream side and sodding on the outside. Structures, such as gated drainage inlets and drop structures in the beds of steeper streams, would also be provided.

4.14 Subproject Selection. Subproject selection is only partly quantitative. In at least some provinces, benefit-cost analysis is used to establish a cut-off rate of return (9%) for acceptable subprojects. Subprojects are then selected using qualitative criteria such as the frequency and severity of flooding, continuations of past projects, the amount of new land created, protection of reconstructed villages and local pressures. These methods are acceptable. Under the project, the use of quantitative methods would be made universal and a minimum rate of return of 11% would be used. Subproject selection for the 1978 construction program has begun and should be completed in February 1978.

4.15 Methods and Status of Design. Handbooks prepared by the Ministries of Construction and Home Affairs give detailed guidance to the county engineers responsible for subproject design. For hydrologic design, a number of alternative methods, including the Rational Method and the observation of past flood levels, are given. These methods are generally satisfactory, though they are not easily applicable to small streams, owing to the lack of data. Where possible, both methods would be used. Generally-accepted methods of hydraulic and structural design are used. Preparation of designs is generally carried out in the first few months of each year, after subproject selection has been finalized but before the construction season begins.

4.16 Construction Methods. Labor-intensive methods would generally be applied, with bulldozers being used to form the larger embankments and trucks to haul quarried stone. Maximum use would be made of locally available materials, such as river boulders and grass sods. Construction would be supervised by stonemasons or other skilled workers, who are often villagers who have acquired their skills on the job. Technical supervision of the subprojects would be by the subdistrict and county engineers. In order to increase the effectiveness of such supervision, vehicles would be provided under the project - one field vehicle for every province and one motorcycle for every county. Survey equipment would also be provided.

Water Supply Component (US$37.4 million)

4.17 Background. Of Korea's rural population of 14.4 million, about 6.3 million (44%) now have access to piped water supply, an increase of 12% since the beginning of the Stage I project. Very few villages had such facilities when the Saemaeul Movement began in 1971. The Government's 1982 target is to bring piped water supply to the 78% of the rural population which lives in communities of 20 or more households. While the proposed component will include some of the larger villages (1,000 to 5,000 persons), it will not directly deal with the rural towns of 5,000 to 20,000 population, where the proportion of population with access to piped water is lower than for the villages. Villages without piped water depend on hand pumps or open wells, which are unreliable and sometimes unsanitary.

4.18 Project Works. The Water Supply component would provide 7,400 villages (with a total population of 3.0 million) with a safe, piped water supply. About 1,600 subprojects would be constructed in 1978, 2,600 in 1979 and 3,200 in 1980, in all provinces of Korea. Subprojects would include the water source and distribution system. The simple piped water systems would be either gravity supplies from a spring or infiltration gallery or would be pumped from a dug well. The springs and wells would be protected from pollution by concrete boxes or slabs, respectively. As an additional safety measure, a chlorinator would be installed in each system. The system would normally be provided with a concrete storage reservoir on high ground adjacent to the village or else a hydro-pneumatic tank would be used to provide pressure. Small diameter polyvinylchloride (PVC) pipes would be used for the distribution system, which would serve individual houses. Normally one faucet in the courtyard of the house is provided.

4.19 Subproject Selection. As the number of villages willing to contribute to their own water supply generally exceeds the capacity of the Government to administer and support, subproject selection is carried out at the county level. No quantitative selection criteria have yet been devised. Greatest weight is usually given to the institutional capacity of the village to carry out the subproject and its willingness to contribute financially to the cost of materials and skilled labor. Weight is also given to the incidence of waterborne diseases and the sanitary state of the existing water supplies. Finally, preference is given to larger villages and those with low per household costs of supply. Subprojects to be constructed in a given year would be selected at the end of the previous year. Subproject selection for the 1978 program is continuing and should be completed in February 1978.

4.20 Method and Status of Design. After confirming the reliability of the proposed water source, the county engineer and sanitarian prepare a preliminary design, which serves as the basis for estimating materials requirements. The detailed design is then prepared by the county engineer (or, in some cases, a local consulting firm), using principles laid down in a Ministry of Health and Social Affairs (MHSA) manual. Under an accelerated procedure recently adopted by MHSA, preliminary designs are now prepared towards the end of the previous year (to allow time for materials procurement) and final designs are prepared in the first few months of the year.

4.21 Construction Methods. Construction would be labor-intensive and large quantities of volunteer labor would be used for digging trenches and wells and making spring boxes and reservoirs. Skilled labor would be hired by the village for such tasks as steel bending, jointing pipes and installing electric pumps. In order to increase the effectiveness of the county engineers and sanitarians in inspecting works under construction (and in operation), one motorcycle would be procured under the project for each county not now having one, as well as one field vehicle per province.

4.22 Construction Schedule. Most subprojects in a given year would commence in March or April and would be completed by June. However, some of the larger or more complicated subprojects would require until September or October.

Rural Telephones Component (US$25.1 million)

4.23 Background. All communications services in Korea are administered by the Ministry of Communications (MCM). Although not financially autonomous, MCM operates on a "Special Fund" to which revenues and external loans are credited and there is little dependence on budgetary assistance. Korea has only about 1.3 million telephones (or 3.9 per 100 population) but the rate of growth is an impressive 18% per year. About 81% of telephones are automatic and located in the 34 cities with more than 50,000 population. The rest of the country is classed by MCM as rural and is served mainly by manual (common battery or magneto) lines. The telephone network closely parallels the administrative structure, possibly because telephone exchanges are generally located in the post office building. Major exchanges are located in the county (gun) towns, which in turn are linked to the subdistrict (myon)

exchanges. There are not normally any exchange facilities below this level but this still means that few of Korea's rural population would be more than 5 to 10 km from an exchange. At this stage of Korea's development, government policy is not to provide private lines outside the limits of the subdistrict town. Villages (Ri or Dong) are being connected to the network through single, public lines.

4.24 Rural Telephones Program. Under the Fourth Five-Year Plan, the Government is continuing to expand and modernize the telephone network in both urban and rural areas. Installed capacity will increase to 2.7 million lines. In the rural areas, county exchanges will be automated, 240,000 automatic lines will be added in the county towns and 200,000 manual lines at the subdistrict level. In addition, all villages will be connected to the network. In all, rural telephone lines will increase from 355,000 in 1976 (2 per 100 rural population) to 803,000 in 1981 (3.6 per 100), or a growth rate of 18%.

4.25 Project Works. The Rural Telephones component is a two-year slice in MCM's rural telephones program and would have two principal parts: 2,704 new village lines (to complete the connection of all villages to the network); and, 75,000 lines of additional capacity in the subdistrict (myon) towns, including some new exchanges. The component would cover all provinces of Korea. Each of the 2,704 village lines would consist of a single, open-wire, pole mounted line, terminating in a public call office. An ordinary manual instrument is used, with no coin box or booth. Instead, it is placed in the residence of a responsible person (the manager) designated by the Saemaeul Committee. The Manager collects all charges and fetches the recipients of incoming calls, for which he receives a commission of 10% of all collections.

4.26 Of the additional capacity at the subdistrict town level, 36,000 subscriber's lines would be constructed in 1978 and 39,000 in 1979. Of the 75,000 lines to be installed, 65,000 would be magneto-type. About 20 new exchanges would be established but most of the 650 switchboards (each with 100 lines capacity) would be added to existing exchanges. About 10,000 new common battery lines would be added to exchanges using that system but no new common battery exchanges would be established. Installation of new manual equipment may seem unusual in the Korean context but it must be seen as a temporary measure. Manufacturing capacity for automatic equipment is already fully committed to the heavy urban program. As electronic switching is introduced in the large cities, surplus electromechanical equipment will be available for the rural towns, while the present manual equipment could be used for future village exchanges. In addition, as the lines to be installed under the project are mostly extensions to existing exchanges, the marginal installation cost is quite low when the same manual system is used. No buildings would be required, as available space in the existing post offices would be used. The additional tollboards to be installed to service the expanded switchboards are not included in the project, as MCM has other funding for this purpose.

4.27 Pilot Project. In order to make a rational decision on the type of equipment to be used in rural areas in the 1980s, a small applied research unit has been set up within MCM to carry out comparative studies, including field trials. Techniques to be studied included space and time division digital switching, random access VHF systems, electronic exchanges and concentrators and electronic party line systems. As MCM has sufficient funding for this program, it would not be financed under the project.

4.28 Subproject Selection. As the village line program would be completed in 1978, no selection of subprojects is required. Additional lines in the subdistrict towns are allocated in accordance with demand, based on informal surveys of the numbers of potential subscribers. The number of pending applications is not a reliable guide, as such applications must be accompanied by a deposit and potential subscribers are reluctant to make such deposits until after the exchange capacity has been increased. Subproject selection for the 1978 program would be completed by March 1978.

4.29 Design and Construction. Planning and design of the new installations would follow well-established practices within MCM. Installation would also be done by MCM's own staff. The standard of past work is completely satisfactory. There would be no volunteer labor contribution to this component. However, the full cost of the component would be recovered from the beneficiaries (para. 5.08).

Cost Estimates

4.30 Details of the project costs are given in Annex 2 and summarized in Table 4.1. The total project cost is estimated at US$232 million, of which US$95 million or 41% would be foreign exchange. The cost estimate (from which all direct taxes have been excluded, as the executing agencies are exempted from import duties and sales taxes) is based on recent experience with similar work by the agencies concerned, unit costs being updated to estimated 1978 levels. The estimates assume that most contracts for the supply of equipment and materials and all civil works contracts would be won by local bidders. For the Irrigation component, where the subprojects to be implemented have already been identified, physical contingencies of 15% have been applied to the estimates for civil works, equipment and materials and 10% to estimates for land acquisition. For the other components, where the final number of subprojects to be constructed in a given year would be decided shortly before the beginning of the working season, a physical contingency of 10% has been added. Overall, physical contingencies amount to 11% of the base cost. A rate of price escalation for all items of 10% per year throughout the project period has been assumed on the grounds that construction costs (particularly for irrigation) in Korea have consistently risen faster than general price levels and that inflation in Korea has been higher than worldwide levels and is expected to continue to be so for the next few years. However, because of the relatively short duration of the project, price contingencies amount to only 14% of base costs plus physical contingencies. The above cost estimates do not include the value of volunteer labor, which is important for the Water Supply component and, to a limited extent, the River Training component.

Table 4.1: SUMMARIZED COST ESTIMATES

Item	Local	Foreign	Total	Local	Foreign	Total	Foreign exchange
	----- W billion -----			---- US$ million -----			(%)
Irrigation	21.8	17.8	39.6	45.0	36.8	81.8	45
River Training	14.6	3.6	18.2	30.0	7.5	37.5	20
Water Supply	10.0	8.1	18.1	20.6	16.8	37.4	45
Rural Telephones	6.1	6.1	12.2	12.6	12.5	25.1	50
Miscellaneous							
- Training	-	0.1	0.1	-	0.2	0.2	100
- Project Monitoring	0.1	-	0.1	0.1	-	0.1	0
- Project Evaluation	--	0.1	0.1	0.1	0.1	0.2	50
Subtotal	52.6	35.8	88.4	108.4	73.9	182.3	41
Contingencies							
- Physical	5.6	4.3	9.9	11.7	8.9	20.6	43
- Price	8.2	6.0	14.2	16.9	12.2	29.1	42
Total	66.4	46.1	112.5	137.0	95.0	232.0	41

Financing

4.31 The proposed Bank loan of US$95.0 million would finance the project's foreign exchange requirements. Sources of funds for the project are shown in Table 4.2. The availability of sufficient local funds in the 1978 budget was confirmed at negotiations.

4.32 Government loans for the Irrigation component would be made to the subproject owners, the Farmland Improvement Associations (FLIAs), through the National Agricultural Cooperative Federation (NACF). Terms and conditions are discussed in para. 6.03. The internal financial arrangements for River Training are discussed in more detail in Annex 3. The plan is unusual in that the villages are given some latitude as to how the government contribution is used. Unskilled labor for these subprojects may be volunteered but most is provided by "needy people," who are paid a subsistence wage, partly as a form of social welfare. Needy people are a well defined group of low-income or disadvantaged people, who may constitute 10-15% of the village population and who would roughly correspond to the target group of the absolutely poor. In view of this, payment of a subsistence wage, rather than the volunteer labor that is normally expected for Saemaeul activities of this kind, is equitable. Even so, all workers on River Training subprojects are encouraged to return up to half their earnings to the Village Development Fund for reinvestment in productive activities. Income from new farmland created under the program also accrues to the Village Development Fund.

Table 4.2: FINANCING PLAN

Component	Total cost (including contingencies) US$ m	National budget /a Contribution %	National budget /a Contribution US$ m	Loan %	Loan US$ m	Provincial budget contribution %	Provincial budget contribution US$ m	Beneficiaries' contribution %	Beneficiaries' contribution US$ m
Irrigation	113.2	70	79.2	30	34.0	-	-	-/b	-
River Training	43.4	60	26.0	-	-	30	13.0	10/c	4.4
Water Supply	46.5	70	32.6	-	-	-	-	30/d	13.9
Rural Telephones	28.2	100/e	28.2	-	-	-	-	-/e	-
Miscellaneous	0.7	100	0.7	-	-	-	-	-	-
Total	232.0	72	166.7	15	34.0	5	13.0	8	18.3

/a Includes Bank disbursements.

/b The contribution of the beneficiaries to field ditches and final leveling is relatively small and highly variable and has not been evaluated.

/c In addition, part of the Government's contribution will be returned to the Village Development Fund and used to finance other development projects.

/d The volunteer labor would be an additional contribution by the beneficiaries, equal in value to about 50% of the cash cost of the component.

/e New subscribers would make noninterest bearing deposits equal to about 30% of the cost of the component.

4.33 Government funds for the Water Supply component would be disbursed through the MHSA, provinces and counties to the villages affected. The villagers' contribution would be designed to make up the difference between the government contribution and the actual subproject cost and thus would vary in amount between villages. Volunteer labor would be partly compensated by World Food Program food aid during the first two years of the program. Wheat flour (2.4 kg/man-day) would be made available to each project participant but the value of this (W 240) is much less than the market value of labor (about W 2,500/man-day). The Rural Telephones component would be financed entirely from the MCM's "Special Fund" and no subsidies from central finances nor any voluntary contribution from the beneficiaries would be involved, but noninterest bearing deposits from the new subscribers during the two years of the project would amount to about US$8.1 million or 30% of

the cost of the component. Though these deposits are refundable when the telephone is disconnected, the line is invariably allotted to a waiting applicant. The deposit account is thus virtually an interest-free revolving fund available for capital investment.

Procurement

4.34 Vehicles, Equipment and Materials. The project's requirements for vehicles, equipment and materials are listed in Working Papers Nos. C-1 to C-4 and summarized in Annex 2. The following items, totaling US$33 million (plus contingencies) in value (or 50% of equipment and materials) would be subject to international competitive bidding (ICB), in accordance with the Bank Group Guidelines, viz., cement, reinforcing steel and pumps and motors for the Irrigation component; survey equipment for the River Training component; hydro-pneumatic and electric pumps and motors and PVC pipe for the Water Supply component; telephone sets, cables and copper wires for the Rural Telephones component; and all vehicles. A preference of 15% of the c.i.f. price of imported goods, or the prevailing customs duty if lower, would be extended to local manufacturers. A second group of goods, estimated to cost US$6 million (plus contingencies)(or 9% of all goods), namely chlorinators for the Water Supply component and switchboards (and parts), distribution and terminal boxes, concrete poles, steel wires and jointing materials for the Rural Telephones component, would be procured following local competitive bidding (LCB). For these items either total quantities are small or the nature of the supplies (small, simple hardware items or bulky low-value items) is such that there would be no interest from foreign manufacturers. Procedures set up under Stage I, which are satisfactory, would be continued. Bid evaluation and contract awards would be governed by the relevant sections of the Guidelines. As part of the reporting requirements, the Office of Supply of the Republic of Korea (OSROK) (or the Ministry designated to undertake procurement on behalf of OSROK) would submit to the Bank, through the EPB, periodic reports on all LCB procurement, including lists of all bids received. The remaining materials, estimated to cost US$28 million plus contingencies (41% of all goods), are either required in very small quantities or must be procured close to the many, scattered work sites (for example, quarried stone and grass sod for River Training, cement and reinforcing steel for Water Supply); such materials would be procured by the executing agency or the village under local shopping (LSH) from local suppliers, subject to ceiling prices set by the Government.

4.35 Civil Works. Because the 18,000 or so subprojects are individually small and scattered over the whole country, it would not be possible to combine them in packages large enough to be of interest to international contractors. The largest of the subprojects (for Irrigation) would generally be less than US$3 million and are thus relatively small in international terms. Experience on all the ongoing irrigation projects has shown that foreign contractors are unwilling to bid on even considerably larger works of this kind in Korea. The project civil works would therefore be constructed

either through locally advertised contracts (Irrigation), force account (Rural Telephones) or village labor (River Training and Water Supply). The standard form of contract for Irrigation subprojects developed under Stage I would be continued but more stringent prequalification of bidders and broader advertising would be followed under the proposed project. An agreement was reached at negotiations that, for the Irrigation component, local bidding procedures providing for prequalification based on the bidder's experience with work of a similar nature, eligibility for all Korean contractors when the number of qualified provincial contractors is less than ten or the contract exceeds W 1 billion, and award to the lowest evaluated bidder, would be followed. A full list of bidders, together with the amounts of their bids and a brief bid evaluation would be provided to the Bank for all contracts exceeding US$2 million prior to the award of such contracts and bid evaluation and contract award would be governed by the relevant sections of the Guidelines. There would be about six contracts exceeding US$2 million.

Disbursements

4.36 Disbursements for vehicles, equipment and materials procured following ICB would be made at 100% of the c.i.f. or ex-factory cost. Disbursements for all other equipment and materials would be included with disbursements for civil works at the following percentages of certified actual cost: Irrigation 40%; River Training 30%; Water Supply 25% and Rural Telephones 10%. The documentation for such certificates is described in para. 5.10. Disbursements for training would be at 100% of foreign costs, and, for Project Evaluation, at 50% of total cost. The estimated schedule of expenditures on the project, the proposed allocation of the proceeds of the loan, and a quarterly disbursement schedule are presented in Annex 2. Any savings in the loan account would, at the request of the Government, be used to finance additional subprojects of the type included in the project. It is expected that disbursements would be completed by June 30, 1983, about one year after the completion of project construction.

Accounts and Audits

4.37 As the executing agencies are all government departments or government-owned corporations, they would be subject to normal government auditing procedures. Each Ministry has an internal auditing section, to examine its accounts, as well as those of the lower levels of Government and the corporations supervised by the Ministry. The ministerial auditing sections are supervised by the Board of Audit and Inspection, an independent agency reporting directly to the President. As government regulations prevent the Board from making copies of its reports available to the Bank, auditing of the project accounts would be carried out by a private accounting firm, or firms, as has been the case under Stage I. Audit reports on Stage I have been very adequate in their scope and depth and government response to some relatively minor problems uncovered during the auditing process has been prompt and appropriate. An assurance has been obtained that each executing agency would maintain a separate project account, in sufficient detail to identify the sources and application of all funds used in the project (including the beneficiaries' contribution), that these accounts would be audited annually, initially by the auditing section of the responsible

Ministry and ultimately by independent auditors acceptable to the Bank, and that these auditors would submit to the Bank within five months of the close of the fiscal year, an audit report on the project accounts, in such detail as the Bank may reasonably request (Section 4.03 of the Loan Agreement).

Project Initiation Plan

4.38 The major steps to be undertaken before project construction can begin are: completion of subproject selection and designs; and procurement of materials, especially for Water Supply and Rural Telephones (which process has already begun). Critical dates for these and other subsidiary activities are given in Annex 4.

5. ORGANIZATION AND MANAGEMENT

Project Execution

5.01 As has been the case for the Stage I Project, most villages would benefit from no more than one or two subprojects under the proposed project and thus the need for coordination of the various components would be minimal. The components of the project are parts of ongoing programs which are the responsibilities of several Ministries. This division of responsibility would not be changed for the execution of the project but existing provisions for supervising the standards of work and for monitoring and evaluating the effectiveness of the project would be strengthened. The executing agencies for the various components are described below.

5.02 Irrigation Component. Overall responsibility for this component rests with the Farmland Management Bureau of the Ministry of Agriculture and Fisheries (MAF), which is also responsible for project planning and subproject selection. Irrigation subprojects would be owned and operated by the Farmland Improvement Associations (FLIAs), of which 127 exist at present in Korea, covering all the major agricultural areas. While the FLIAs are formally voluntary associations of farmers, they are under close supervision by the Provincial administrations, which appoint the FLIA chairmen, and under indirect supervision by the MAF. The role of the FLIAs in operation and maintenance and agricultural supporting services will be described in paras. 5.07 and 5.15. The FLIAs have a total of 657,000 members and 3,700 employees. Under the project, the FLIAs would evaluate bids and award contracts, provide cement and reinforcing steel to the contractors and make the payments to contractors. Technical services to the MAF for project planning and to the FLIAs for subproject design and construction supervision would be provided by the Agricultural Development Corporation (ADC), a semi-autonomous corporation supervised by MAF, having broad responsibilities for land and water development throughout Korea. ADC has a staff of 1,200 engineers and technicians and is successfully implementing six Bank Group assisted projects. Irrigation subprojects would be designed by ADC's First Survey and Design Department and construction would be supervised by ADC's Project Construction Department, through the Branch (Provincial) Office concerned, on behalf of the FLIA.

5.03 River Training Component. Responsibility for the planning and overall administration of this component would rest with the River Training Section of the Saemaeul Guidance Division of the MHA. The Division would also be responsible for allocating funds and monitoring the progress of implementation. The River Improvement Section of the Construction Bureau in each province would be responsible for allocating funds to the counties and would play a role in monitoring. The Construction Section in each county would plan and design subprojects, sign construction agreements with the villages for Class III rivers, would advise the villagers and inspect the completed work. The subdistrict technical guidance team would be responsible for signing agreements for Class I and II rivers and for day-to-day supervision. The villages would be responsible for the initial planning of the subprojects, disbursing the available funds, preparing progress and completion reports and for maintaining the works.

5.04 Water Supply Component. The Ministry of Health and Social Affairs (MHSA) would be responsible for the Water Supply component, through the Environmental Sanitation Section of its Environmental Health Bureau. With the recent approval of additional positions, the Section is now adequately staffed. The Section is reponsible for establishing policy guidelines, allocating funds, monitoring the progress of construction and conducting staff training programs. The preliminary design of individual subprojects would be the responsibility of the sanitarians in the county administrations. The county Construction Division would then undertake detailed design and supervision of construction, which would be carried out by village labor. Design and construction would be subject to review by an engineer in the Public Health Section of the provincial administration.

5.05 Rural Telephones Component. This component would be planned, executed and operated by MCM, which has a well-structured organization, with separate bureaus for planning, construction, operations and finance (including procurement). Supporting units include a telecommunications laboratory, a training center, and an electronic data processing unit for billing. MCM is well staffed and has successfully carried out a rapid expansion of telecommunications services at all levels. Equipment installation under the project would be carried out by MCM's own technicians, under the supervision of MCM's regional offices, which would also plan and schedule the subprojects and report on progress. The component would create a need for about 2,700 additional permanent operational and maintenance staff (mainly operators for the additional switchboards). These staff would be recruited and trained on the job by MCM as the project is implemented.

Training

5.06 Provision has been made under the project for technical training needed to support the construction components. These needs cannot be completely foreseen in advance but some needs are already apparent. These include: specialized training for ADC staff in hydrologic analysis, earth dam design and dam safety inspections /1; training of MHA staff in the design

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/1 Unless the Government should designate another agency for this function.

of levee banks for small rivers and in the economic evaluation of such projects; and, possibly, training needs associated with the rural telephones pilot project. Unlike the Stage I project, where training funds were used mainly for short-term study tours, the emphasis under the new project would be on longer duration, more specialized training, and might include post graduate university courses or work study programs with government agencies in developed countries. Training proposals originating with the executing agencies would be channeled through the responsible Ministries to the Project Monitoring Unit (para. 5.10) for screening. Proposals involving foreign training would be presented to the Bank for review and approval.

Operation and Maintenance

5.07 The completed irrigation subprojects would be operated and maintained by the FLIAs. The standard of operation and maintenance (O&M) of similar works completed in the past is generally very satisfactory. O&M costs (in 1978 prices) would average about W 44,000/ha (US$90/ha) for reservoir systems and W 61,000/ha (US$125/ha) for pumping stations, but there could be wide variations betwen subprojects. These costs also include some agricultural extension services (para. 5.15). MCM would be responsible for O&M of the Rural Telephones subprojects, which would be integrated with the overall telecommunications network. The other components would be maintained by the villagers themselves, under the guidance of the Saemaeul leader. In most cases, O&M by the villagers for these types of works has been satisfactory. A regular cash contribution would be collected from water supply consumers to pay for cash costs of operation (electricity, repairs, chemicals, etc.) and also, in many cases, to generate a small surplus for the Village Development Fund. River Training subprojects would be maintained by voluntary labor except where major flood damage is involved, when contractors supervised by the county would be used. An assurance has been obtained that, where operation and maintenance is the responsibility of the villagers, a system of regular periodic inspections by county-level staff would be established (Section 4.08 of the Loan Agreement).

Cost Recovery

5.08 Cost recovery provisions for the Irrigation component are discussed in Chapter 6, following the discussion of farm income. Cost recovery provisions for the other components are discussed below. For the River Training component, there would be no direct recovery of costs, except to the extent that part of the labor is volunteered and the remainder is paid subsistence wage rates, some of which is returned to the Village Development Fund. This is appropriate, given the low cost of the component per beneficiary (US$10/beneficiary, if all village residents are counted as beneficiaries), the difficulty of identifying individual beneficiaries, and the fact that wages would be earned by the absolute poor and part of the cost added to the Village Development Fund. For the Water Supply component, the beneficiaries would contribute about 30% of the cash cost and all O&M costs and would also contribute considerable amounts of volunteer labor. This level of cost recovery is appropriate in view of the nature of the service provided and the income levels of the beneficiaries. Telephone subscribers would pay installation charges, deposits and tariffs which would more than cover the capital,

operation and maintenance cost of the component (para. 7.14). Full cost recovery is appropriate for telephone service, as the beneficiaries of the subscribers' line program generally have above average incomes, while the charges for the village public call offices would be paid only by those who use the service.

5.09 For each component, assurances have been obtained that project beneficiaries would continue to contribute to the capital and annual cost of the facilities to be provided under the project at no less than the existing levels, which are described above (Sections 4.04, 4.05 and 4.06 of the Loan Agreement).

Project Monitoring and Supervision

5.10 Monitoring. The Government has designated EPB as the appropriate agency to monitor the progress of the project, to draw the attention of the executing agencies to any problems or delays and to act as a channel of communication with the Bank. A master list of subprojects to be executed each year under the project would be drawn up at the beginning of each year. During project execution, other subprojects could be substituted with the agreement of the Bank. At the end of each calendar quarter, the executing agency for each component of the project would prepare a progress report giving the physical status and expenditure on each subproject on the master list. This report would be forwarded by the responsible Ministry to the EPB. A Project Monitoring Unit (PMU) has been established within EPB's Budget Bureau to receive these reports, to check them for internal consistency and for conformity with Ministry of Finance records of disbursements against the project components, to prepare summaries of the overall physical and financial progress of the project (including information on procurement, to be supplied by OSROK) and to prepare applications for reimbursement, based on the total expenditure during the quarter. Except for the Irrigation component, for which MAF's complete report would be forwarded, only the summary of the ministry reports would be sent to Washington in support of the disbursement application. The detailed reports of the executing agencies would be available in Korea for review by supervision missions. Formats for the detailed reports and the summary were agreed upon during negotiations. An assurance has been obtained that the Ministries responsible for the various components of the project would submit to the EPB within one month of the close of each calendar quarter, a detailed report on the physical and financial progress of all subprojects, in such form as shall be agreed with the Bank; and that the EPB would submit to the Bank, within two months of the close of each calendar quarter, a summary report on the physical and financial progress of the project, together with information on procurement and spot-checking in such form as shall be agreed with the Bank (Section 3.03 of the Loan Agreement). At the completion of project construction, EPB would submit a project completion report to the Bank (Section 3.05 of the Loan Agreement).

5.11 Spot-checking. The system of spot-checking of works in progress established under Stage I would be continued. At the end of each quarter, the Ministry responsible for each component would select not less than ten subprojects at random and visit the sites, in order to verify the reports of

the executing agency in respect to these subprojects. It should be noted that the executing agency is either a local government, a branch office or an autonomous body (ADC and the FLIAs) and thus a Ministry check would be reasonably independent. The quarterly reports of the executing agencies, forwarded to EPB through the Ministries, would be accompanied by a statement as to which subprojects had been visited, the results of the visits and follow-up action taken.

5.12 Supervision. Owing to the large number of subprojects, systematic supervision of each subproject by the Bank itself would be impossible. Even so, the project would require a greater than normal supervision input. As the interests of the Bank and the Government in speedy and efficient execution of the project coincide, it would be possible for the Government, through the monitoring arrangements outlined above and the auditing procedures of para. 4.37, to undertake the bulk of the necessary supervision work. Bank supervision missions would then be free to concentrate on the overall progress of the project, technical problems, the evaluation of project benefits and so on. These missions would also make spot checks on randomly selected subprojects.

Project Evaluation

5.13 As has been the case under Stage I, the Economic Planning Bureau of the EPB would continue to be responsible for evaluation studies. The Bureau, in consultation with the Bank, would continue to program the studies, prepare terms of reference, monitor the progress of the evaluation studies, review their conclusions and incorporate their findings in future rural development planning. Under the project, the studies begun under Stage I would be continued. Additional high priority studies would include: measurement of the benefits of the new project components, namely River Training and Rural Telephones, for which few benefit data are available at present; analysis of the effectiveness of the present administrative, planning and subproject selection mechanisms; the measurement of changes in rural attitudes to development; and an assessment of the impact of the Saemaeul Movement generally. Clearly, not all these questions will be answered in a three-year period but the Government feels increasingly that the evaluation mechanism to be continued under the project would have permanent value.

5.14 Evaluation studies could be carried out by a number of agencies. Some of the more straightforward studies (for example, usage of rural telephones) would be carried out by the responsible Ministry. Others would require specialized research bodies, such as the Korea Development Institute, or the National Agricultural Economics Research Institute (NAERI). However, it is likely that NAERI would continue to take the lead in the execution of the studies, as at present. An assurance has been obtained that a program for continuing the evaluation studies would be submitted to the Bank for review before October 1, 1978 and that the Bank would be consulted periodically thereafter on the scope and form of such studies (Section 3.07 of the Loan Agreement).

Agricultural Supporting Services

5.15 As the principal agricultural supporting services in Korea were described in detail in the Appraisal Report for Rural Infrastructure I (Reference No. B-1) and they are generally of a high standard, only a brief summary will be given here. Research and extension services would be provided by the Office of Rural Development, with additional extension work by the FLIAs. Fertilizer consumption in the Irrigation subproject areas would rise from 3,400 to 5,400 nutrient tons as a result of the project, but these needs could be easily met by the NACF or the private sector. Seed production and distribution is relatively efficient. Farmers obtain credit, mainly from NACF, for about 30% of their cash inputs and no difficulties are foreseen in meeting the project's requirements for incremental credit. The principal farmers' organizations are the FLIAs and, at a lower level, the Hung Nong Gae ("farmers' action groups") which are responsible for water distribution at the local level and act as points of contact for the extension service. The above services and organizations are expected to have little difficulty in meeting the needs of the project. However, in order to ensure a rapid build-up of benefits from the Irrigation component, an assurance has been obtained that ORD or the responsible FLIA would appoint an additional extension agent in every myon (subdistrict) in which an irrigation subproject would be constructed, before December 31, 1978, except where an additional agent had been appointed under Stage I (Section 3.02 of the Loan Agreement).

6. PRODUCTION, FARM INCOMES AND COST RECOVERY (IRRIGATION COMPONENT)

Production

6.01 The present cropping pattern varies considerably between subprojects and depends to a large extent on the amount of upland to be converted to rice paddies and irrigated under the project (para. 4.04). A composite cropping pattern for the irrigation component is shown in Table 6.1, based on the average of a 10% sample of all subprojects. Both the cropping intensity (148%) and the extent of improved rice varieties (40%) appear to be unexpectedly high, possibly because the sample was not truly representative in this respect. However, the increment to future with project conditions is similar to expectations and to other irrigation projects in Korea. The analysis is confined to the project area - the area to receive irrigation - whereas surveys indicate that this area represents only about one-third of the farmers' total area, the remainder generally being upland, on which a large variety of crops is grown. It was assumed that the project would not affect production from this remaining area, except to the extent that high-value crops, such as garlic, would be transferred from converted upland areas to other upland areas, in order to preserve this important source of income. The future cropping pattern shows an increase in the use of improved rice varieties to 86% and an increase in the cropping intensity to 179%, mainly through an increase in the winter barley areas, made possible through improved drainage and more timely planting under the project. Present yields (Table 6.1) of all crops are below national average levels, though fairly high in absolute terms as a result of good cultural practices and high fertilizer usage. Lack of a timely and dependable water supply is the main constraint

on production. At full project development, about three years after the completion of construction, yields would rise to near or slightly above national average levels. In the case of rice, the incremental yield attributable to the project is estimated at 1.1 ton/ha (milled basis) (Table 6.1). Without the project, cropping intensity and yields would increase only modestly, as present levels are close to the maximum potential for rainfed conditions. The Irrigation component would lead to an increase in rice production of 21,000 tons per year plus 10,000 tons of barley and small amounts of other crops.

Table 6.1: IRRIGATION COMPONENT: PRESENT AND FUTURE CROPPING PATTERNS AND YIELDS

CROPPING PATTERNS

Crop	Present situation		Future without project		Future with project	
	ha	%	ha	%	ha	%
Improved rice	3,666	40.2	3,776	41.4	7,825	85.8
Traditional rice	2,800	30.7	2,763	30.3	1,295	14.2
Barley	4,195	46.0	4,268	46.8	6,667	73.1
Garlic	118	1.3	120	1.3	146	1.6
White potato	73	0.8	82	0.9	246	2.7
Onion	0	0.0	0	0.0	137	1.5
Other upland crops	2,609	28.6	2,563	28.1	0	0.0
Total land area	9,120	100.0	9,120	100.0	9,120	100.0
Total cropped area	13,461	147.6	13,572	148.8	16,316	178.9
Overall cropping intensity	148		149		179	

YIELDS AND PRODUCTION

Crop	Present situation		Future without project		Future with project	
	ton/ha	tons	ton/ha	tons	ton/ha	tons
Improved rice /a	3.9	14,300	4.0	15,105	5.0	39,125
Traditional rice /a	2.9	8,120	3.0	8,290	4.0	5,180
Barley /b	1.9	7,970	2.0	8,535	2.8	18,670
Garlic	4.2	495	4.3	515	6.8	995
White potato	10.1	740	10.5	860	14.3	3,520
Onion	0.0	0	0.0	0	24.0	3,290

/a Milled basis
/b Polished basis

Farm Incomes

6.02 The irrigation component would benefit about 26,000 families, with an average farm holding of 1.0 ha, of which 0.35 ha on average would be irrigated under the project. Three farm sizes were used: benefited areas of 0.12 ha, 0.35 ha, and 1.05 ha (corresponding to total farm holdings of 0.35 ha, 1.0 ha and 3.0 ha respectively). Farms over 3.0 ha would typically account for less than 2% of farms and about 7% of area. In order to simplify the analysis, production data identical to that for the project as a whole were used for each farm size, even though there is evidence that income per ha is often higher for the smaller farms. However, nonfarm income was allowed to vary according to farm size, as was family size. The results of the analysis are shown in Annex 5 and summarized in Table 6.2.

Table 6.2: IRRIGATION COMPONENT: FARM INCOMES
(US$)

Farm size (ha)	0.35		1.0		3.0	
	Without project	With project	Without project	With project	Without project	With project
Income from project (irrigable) area:	272	460	790	1,330	2,135	3,670
Income from other farm area:	163	163	398	398	854	854
Nonfarm income:	335	482	262	372	406	616
Net household income:	770	1,105	1,450	2,100	3,395	5,140
Per capita income:	165	237	255	370	510	772

The project would increase average family incomes of the benefited areas from W 385,000 (US$790) to W 645,000 (US$1,330), an increase of 70%. Nonfarm income would also increase, as a result of the additional opportunities for hired labor created by the project; such labor would be mainly supplied by the smaller farmers. The average net income of the beneficiary families would increase from W705,000 (US$1,450) to W 1,020,000 (US$2,100), an increase of 45%, all in 1978 monetary values. The growth rate of income in the subproject areas would average about 8%, similar to the expected growth rate of the economy as a whole. Therefore, the project would have only a slight effect on national income distribution or the incidence of relative poverty. It would, however, prevent the worsening in distribution that would take place in its absence. The absolute poverty income level in 1978 would be about US$850 per family. At present, about 25% of the beneficiary families are below this level but most of these families would move out of absolute poverty as a result of the project.

Cost Recovery (Irrigation Component)

6.03 For irrigation subprojects, farmers would pay the full cost of O&M, through a water charge imposed by the FLIA, as well as repaying a loan equal to 30% of the capital cost of the project (about US$2,600/ha on average, excluding a small amount of contributed labor) at 3.5% interest with repayment over 35 years, including five years of grace. Farmers also pay a production tax of 6% on all foodgrain production above 1.4 ton/farm, the assumed subsistence level. Using a discount rate of 10% and a period of 50 years, this implies a cost recovery index of 18%, if an inflation rate of 10% per year is assumed. The rent recovery index would vary from 16% to 24%, depending on farm size, with a project average of 18% at an inflation rate of 10%. Details are given in Table 6.3. These rates indicate that the farmers would have ample financial incentive to achieve projected yields and cropping intensities. In theory, a case could be made for charging little or nothing for those below some level of relative poverty (for example, half the national average income, which would include about two-thirds of the beneficiaries of the irrigation component). Beneficiaries above this level should pay a much larger share or the full project rent. However, a system of this kind would not be politically or administratively feasible in Korea. The existing charges are thus somewhat too onerous on the smaller farmers and should probably be higher for the largest farmers but, given the relatively even distribution of farm sizes in Korea, they are, on the whole, considered satisfactory, especially when it is kept in mind that:

(a) although government pricing and subsidy policies have raised rural incomes relative to urban incomes over the past five years, it is unlikely that the terms of trade for agriculture will improve much in the future. A higher level of project charges would not be consistent with the objective of preventing a widening gap between rural and urban incomes. As shown by the slightly progressive rent recovery indices, the proposed charges would have a small impact on income distribution within the subproject areas;

(b) the absolute level of project charges at full development would be considerable, averaging US$280/ha of irrigated land; and

(c) collection rates for water charges in Korea are commonly greater than 98% of assessments.

An assurance has been obtained that the beneficiaries of the Irrigation component would continue to contribute to the capital and annual cost of the facilities to be provided under the project at no less than the existing levels, which are described above (Section 4.04 of the Loan Agreement).

Table 6.3: IRRIGATION COMPONENT: RENT AND COST RECOVERY
(1978 prices)

	.35 ha	1.0 ha	3.0 ha	Total project
	W'000			W million
At Full Project Development /a				
Incremental gross value of farm production /b	127	368	1,124	
Less: Incremental cash production costs (including hired labor)	19	56	208	
Less: Incremental interest	-	1	4	
Equals: Incremental net cash income	108	311	912	
Less: Incremental - imputed return on own capital /c	1	4	15	
- imputed value of farm management /d	13	37	112	
- depreciation /e	5	15	45	
- allowance for risk and uncertainty /f	25	74	225	
- incremental general taxes /b	1	4	24	
Equals: Project rent	63	177	491	
Project rent as % of incremental net cash income	58	57	54	
Incremental project charges - O&M cost	11	32	97	843
- Capital cost recovery /g	5	15	46	447
- Total direct charges	16	47	143	1,290
Discounted over the Life of the Project /h				
Project rent	641	1,800	4,995	47,602
Incremental total direct charges /g	122	359	1,283	9,976
Rent recovery index (%) - at 0% inflation	19	20	26	21
- at 10% inflation	16	17	24	18
Project costs (capital and recurrent)				46,563
Cost recovery index (%) - at 0% inflation				21
- at 10% inflation				18
Farm income per capita at full development (1985) US$	237	372	772	
Absolute proverty level (1977): US$200				
Consumption per capita (1977) : US$630				

/a All calculations are in January 1978 financial prices and represent incremental conditions, i.e., with project minus without project.

/b From Working Paper No. C-5, Table 5.

/c Assuming 70% of production costs are met from farmers' own resources, an allowance of 10% return on capital is made.

/d Ten percent of incremental gross value of production.

/e Equipment at 5% of cost; buildings at 3%; land development at 2%.

/f Twenty percent of incremental gross value of production.

/g Assuming no inflation. Since capital cost recovery is fixed in nominal terms, the real value of this recovery would be lower the higher the rate of inflation.

/h Net present value, discounted at 10% p.a. over the project life (50 years).

7. BENEFITS, JUSTIFICATION AND RISK

7.01 The Project would benefit about 18,000 villages or 7.7 million people (about 48% of Korea's rural population), through intensification of agricultural production, opening up of a small amount of new farmland, and an improvement in the quality of rural life, through the provision of water supply and telephone services. Of these beneficiaries, about 500,000 (the beneficiaries of the Irrigation component or of private lines under the Rural Telephones component) would benefit to a large degree. The project would have a lesser impact on the remaining 7.2 million beneficiaries. The number of beneficiaries is unusually high because there would be little "overlap" between the subprojects under the various components. The project would also encourage decentralized decision-making, help to develop village-level institutions, and would be a further step in the Government's efforts to narrow inequalities between the urban and rural sectors, as well as within the rural sector. Other impacts of the project include an increase in short-term and long-term employment and a reduction in food grain imports.

7.02 Each component has been analyzed separately. Where possible, an indicative economic rate of return, based on a "typical" subproject or on average conditions, has been calculated. In the case of rural telephones, a modified financial analysis has been used to produce a minimum estimate of the economic rate of return. Quantification of the benefits of water supply has not been possible and a qualitative justification is therefore used.

Assumptions

7.03 Prices and Standard Conversion Factor. All prices have been adjusted to projected 1978 levels (Annex 5). For crops traded on the world market, economic efficiency prices have been based on the Bank's projections of 1985 world market prices. For other crops, and for farm income analysis, average farm gate prices for the last three years (adjusted for inflation) have been used. A standard conversion factor of 0.85 has been used to correct distortions in the exchange rate, implying a shadow exchange rate of W 570 = US$1 (compared to the official rate of W 485 = US$1).

7.04 Labor. As the rural labor force is approximately fully employed during the crop season and is also fairly mobile, it is appropriate to use observed wage rates for hired labor as the opportunity cost of labor, that is, W 2,200/man-day during the cropping season, except for the peak months, June and October, when labor shortages often occur and a wage rate of W 2,500/man-day is appropriate. A wage rate of W 1,500/man-day has been used for the winter, when there is little wage employment, though self-employment, Saemaeul activities and some migration to the towns do provide some employment opportunities. Differences in wage payments between male and female workers have been taken into account in valuing labor. Wage payments were multiplied by the standard conversion factor to express them in border prices.

Irrigation Component

7.05 ADC has made an economic evaluation of every subproject proposed for inclusion in the component, the results of which have been used in subproject selection. A sample of six subprojects, representative of various provinces of Korea and including both reservoirs and pumping stations, was selected to confirm this analysis. The methods used by the Bank in calculating the rates of return of these six subprojects are given below. Cropping patterns, yields and production with and without the project are shown (in composite form) in Table 6.1. Crop budgets in economic prices are given in Annex 5. Full details are given in Working Paper No. C-5.

7.06 Project Cost. The economic efficiency cost of the project investment amounts to US$68.7 million (US$7,520/ha) in 1978 border prices and net of all taxes and transfer payments. An evaluation period of 30 years has been used, at the end of which the project facilities are assumed to have a salvage value of 25% of original cost. The cost stream also includes O&M costs of US$77/ha (the weighted average for reservoir and pumping subprojects expressed in economic efficiency prices) and replacement of pumps every 15 years.

7.07 Economic Analysis. According to ADC's analysis, the 85 subprojects reviewed for possible inclusion in the component had rates of return ranging from 10% to 25%. According to the Bank's analysis, these estimates overstate the rate of return by about 1% at the lower end of the range and by about 5% at the upper end. Adjustments of this nature were then made for the rates of return for all proposed subprojects and a cutoff rate of 11% (12% with ADC's methodology) applied to make the final selection of subprojects. The 61 subprojects selected had rates of return in the range of 11% to 20%. The weighted average rate of return for the Irrigation component is 13%.

7.08 Risks. Given the experience of ADC and the FLIAs with projects of similar scope and complexity, no organization or management problems are expected. Rapid inflation in 1973 and 1974 led to sizable cost overruns on projects initiated in the early 1970s. However, experience with actual costs for similar work has been taken into account in estimating the costs of the proposed project, inflation is now being brought under control, and larger provisions for price increases have been made for this project and other projects recently financed by the Bank. As a result, the risk of cost overruns has been reduced. On the benefit side, the project would be backed up by very satisfactory agricultural supporting services. Therefore the risk of not achieving the projected rate of return is believed to be low.

River Training Component

7.09 Methodology. The objective of the analysis was first to develop a simple yet reliable formula for calculating the benefits of these kinds of projects, which could then serve as a subproject selection mechanism, and second to apply this formula to calculate the overall rate of return of the proposed program using data available for the 1977 program. Benefits which are readily quantifiable include the value of new farmland created behind

the levees and the flood damage prevented on existing cropland and houses subject to flooding. In order to simplify the analysis, it is assumed that the levee banks would be fully effective in preventing damage from floods up to a certain return period (a one in ten year flood was assumed) and would have no effect on floods of greater magnitude. Other benefits which are harder to quantify include the value of the road constructed on top of the bank in some subprojects, the value of creating the potential for irrigation in some cases and the value of preventing bank caving and the deposition of coarse sediments on valuable cropland.

7.10 Formula. A formula, shown in Working Paper No. C-6, has been devised for calculating the benefits from the creation of new land and the prevention of flood damage to crops and houses. Floods are divided into several categories, according to return period, and the potential damage to area and percentage of loss assessed for each category. In order to encourage the more widespread use of analytical methods in subproject selection, it was agreed at negotiations that the Ministry of Home Affairs would cause the counties to carry out an economic evaluation of all subprojects proposed for inclusion in the River Training component and ensure that all subprojects selected for the River Training component show an economic rate of return of at least 11%.

7.11 Evaluation of River Training Program. The MHA has collected data on the areas protected by the 1977 subprojects which have been extrapolated to estimate the benefits of the proposed program. Three categories of floods were used, corresponding to return periods of: one year; two to five years; and five to ten years (assuming that the maximum flood that the levees would be designed to contain would have about a one in ten year probability of exceedence). The percentage damage to standing crops is highly dependent on the timing of the flood and would vary from locality to locality. For this overall analysis, it was assumed that floods would be more likely to occur in August or September, the critical grain formation stage for rice, but that inundation would be fairly brief. Therefore, a damage factor of 30% of gross value (based on research in Japan) was used. For upland crops, the depth of flooding is likely to be less and a factor of 20% was used. For houses, each flood event was assumed to cause damage equivalent to 10% of the value of the house and its contents, the number of houses affected increasing with the magnitude of the flood. The evaluation period was restricted to ten years, as it is likely that, on average, a major flood would heavily damage the subproject within this period. Using project costs from Table 4.1 and annual maintenance costs of 5% of capital cost, the rate of return was found to be about 30% (Working Paper No. C-6). While the reliability of this estimate is somewhat low, as a result of the extrapolations of the benefited areas referred to above and the need to make fairly rough calculations of percentage losses, the result clearly indicates the economic merits and high priority of the program.

7.12 Distribution of Benefits. The total number of families benefiting from the component would be about 700,000. Benefits would accrue more heavily, however, to those villagers owning land or houses in areas subject

to flooding. While no measurements have been made of the income levels of these persons, it is reasonable to assume that their incomes would tend to be below the rural average.

Water Supply Component

7.13 The major benefit of the Water Supply component would be an improvement in the quality of village life for about 590,000 families. The unit cost (US$63/family plus contingencies) would be quite low, considering the standard of service. The standard of service (house connections) would be appropriate to the level of income of the beneficiaries and may be considered as a necessary complement to other more directly productive rural investments. In addition, the Water Supply component would have some health benefits, would result in some time savings, and would assist in developing the institutional capacity of the villages for further development. However, none of these benefits could be readily quantified and no attempt at numerical analysis has been made. Given the cost recovery arrangements of the component, a modified financial analysis, similar to that undertaken for telephones (para. 7.14), would tell us little about the value of the service to the consumers. However, the fact that the villagers contribute about 50% of the capital cost, in the form of volunteer labor and cash, as well as all O&M costs, is an indication of the high value that they place on this service and strengthens the conclusion that it is justified.

Rural Telephones Component

7.14 Some attempts have been made to measure directly the socio-economic benefits of telephone service in rural Korea. A survey by MCM in 1975 showed that a village public call office handled, on average, 85 local (within the subdistrict) and 160 long-distance calls each month and that the telephone service helped to remove feelings of isolation and improved the villagers' income through timely market information and the ability to bypass middlemen. In addition, the local administration was able to disseminate information to the villages more quickly and much time could be saved by eliminating personal visits. In the absence of very precise measurements of benefits, the charges paid by telephone subscribers for the service may be taken as a minimum measure of their willingness to pay and thus of the economic value of the service. Using MCM records of telephone usage and growth rates and the current levels of tariffs, the incremental revenues attributable to the project can be compared to its incremental capital and operating costs. If deposits are included as revenues (since they form a kind of revolving fund) and an evaluation period of 25 years assumed, the discounted financial rate of return (or the minimum estimate of the economic rate of return) would be 20%. If deposits are not counted as revenue, the minimum rate of return is 12%. The program would benefit 75,000 families through private connections. These families have incomes above the rural average and it is appropriate that they should repay more than the full cost of this service. The village line program would benefit about 220,000 families, who would also repay the full cost of their service, through call charges.

Average Rate of Return

7.15 The weighted average rate of return for the project, excluding the Water Supply component for which no quantification of benefits was possible, would be approximately 20%.

8. AGREEMENTS REACHED AND RECOMMENDATION

8.01 Agreements were reached with the Government during negotiations on the following major points:

(a) availability of funds in the 1978 budget (para. 4.31);

(b) bidding procedures for Irrigation civil works contracts (para. 4.35);

(c) formats for the quarterly reports (para. 5.10); and

(d) the economic evaluation of River Training subprojects (para. 7.10).

8.02 During negotiations, assurances were obtained from the Government on the following major points:

(a) the Borrower would, under arrangements satisfactory to the Bank, cause the dams constructed under the project to be periodically inspected in accordance with sound engineering practices in order to determine whether there are any deficiencies in the condition of such structures, or in the quality and adequacy of maintenance or methods of operations of the same, which may endanger their safety. To this end, the Borrower shall propose to the Bank appropriate arrangements for the Bank's review no later than one year before the expected completion of such structures (para. 4.10);

(b) for each component, project beneficiaries would continue to contribute to the capital and recurrent project costs at no less than the existing levels (paras. 5.09 and 6.03);

(c) a program for continuing the evaluation studies would be submitted to the Bank for review before October 1, 1978 and that the Bank would be consulted periodically thereafter on the scope and form of such studies (para. 5.14); and

(d) ORD or the responsible FLIA would appoint an additional extension agent in every myon (subdistrict) in which an irrigation subproject would be constructed, before December 31, 1978, except where an additional agent had been appointed under Stage 1 (para. 5.15);

8.03 With the above agreements and assurances, the proposed project would be suitable for a Bank loan of US$95.0 million with a 17-year maturity and a 4-year grace period, following standard conditions for Korea. The borrower would be the Republic of Korea.

ANNEX 1
Table 1

KOREA

RURAL INFRASTRUCTURE PROJECT II

Numbers of Saemaeul Villages by Type

Type of Village	Actual				Targets	
	1973	1974	1975	1976	1979	1981
Basic	18,415	10,665	..	-	..	-
Self-Help	13,943	20,000	..	20,165	..	-
Self-Reliant	2,307	4,000	..	14,500	..	34,665
Total	34,665	34,665	..	34,665	..	34,665

KOREA

RURAL INFRASTRUCTURE PROJECT II

Saemaeul Movement

Physical Achievements in Selected Sectors, 1971-1976

	Unit	Up to 1971	1971-1975	1976	Total	Plan for 1977
Rural Roads						
Village roads	km	6,046	33,616	1,107	40,769	374
Farm feeder roads	km	27,200	14,258	1,228	42,686	169
Rural Housing						
Roof improvements	1,000 bldgs.	-	1,638	360	1,998	150
Housing units	Each	-	-	4,244	4,244	10,000
Rural Water Supply						
Water supply systems	Villages	235	11,000	3,860	15,095	2,034
Public Facilities						
Village halls	Villages	13,494	13,557	2,701	29,752	-
Village telephones	Each	-	10,429	2,000	12,420	2,000
Community workshops	Each	-	2,722	527	3,249	-
Agricultural Infrastructure						
River training	km	-	5,338	557	5,895	200
Public warehouses	Each	-	13,258	2,311	15,569	-
Public compost pits	Each	51,793	14,021	2,490	68,304	-
Cooperative markets	Each	-	565	115	680	150
Others						
Reforestation	ha	-	130,277	83,000	213,277	136,700
Nursery stocks	million trees	-	640	336	976	131
Rural electrification	1,000 households	849	1,256	235	2,340	150
Saemaeul factory	Each	-	357	117	474	100

ANNEX 1
Table 2

ANNEX 1
Table 3

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RURAL INFRASTRUCTURE PROJECT II

Gross Investment under the Saemaeul Movement, 1971-76
(W billion)

Source	1971	1972	1973	1974	1975	1976	Total
Government Support							
All programs	4.1	4.4	21.5	30.8	166.8	165.1	424.6
Of Which: Environmental Improvement	(4.1)	(3.3)	(4.8)	(4.8)	..	..	..
Contribution by Villages							
Total /a	8.1	28.0	76.9	102.0	129.1	150.4	461.5
Of Which: Environmental Improvement	(8.1)	(28.0)	(36.3)	(25.6)	..	..	..
Grand Total	12.2	31.3	98.4	132.8	295.9	322.6	893.2 /b
Of Which: Environmental Improvement	(12.2)	(31.3)	(41.1)	(30.4)	..	..	..

/a Includes loans and voluntary labor contributions.

/b Equivalent to US$1.84 billion.

KOREA

RURAL INFRASTRUCTURE PROJECT II

Labor Contributions for Various Saemaeul Projects (1971-1974)
(man-days)

	Per Household				Per Village				%			
	Basic	Self-help	Self-reliant	Average	Basic	Self-help	Self-reliant	Average	Basic	Self-help	Self-reliant	Average
Village roads	8.0	10.0	17.7	12.6	795	902	1,556	1,163	38.0	34.4	30.3	32.4
Farm feeder roads	3.2	7.1	12.1	8.0	320	644	1,066	731	15.3	24.5	20.8	20.4
Small bridges	1.7	2.5	4.1	2.9	172	224	356	267	8.2	8.5	6.9	7.5
Repair of streams	1.1	0.8	3.2	1.9	106	74	280	177	5.0	2.8	5.5	4.9
Repair of brooks	0.2	1.1	3.8	2.0	24	96	337	182	1.2	3.7	6.6	5.1
Paddy rearrangement	0.1	-	0.8	0.4	7	-	56	27	0.3	-	1.1	0.8
Straw products	1.4	0.9	3.2	2.0	138	81	278	188	6.6	3.1	5.4	5.2
Reforestation	1.1	2.3	2.6	2.0	113	211	227	187	5.4	8.0	4.4	5.2
Improvement of roofs	4.2	4.4	11.1	7.2	419	394	974	663	20.0	15.0	19.0	18.5
All projects	21.0	29.1	58.6	39.0	2,094	2,626	5,130	3,585	100.0	100.0	100.0	100.0

ANNEX 1
Table 4

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RURAL INFRASTRUCTURE PROJECT II

Cost Estimates, List of Materials, Schedule of Expenditures and Disbursements

List of Tables

ANNEX 2
Table 1

KOREA

RURAL INFRASTRUCTURE PROJECT II

Cost Estimates: Summary

	Local	Foreign	Total	Local	Foreign	Total	Foreign exchange
	----- W billion -----			---- US$ million ----			%
Irrigation (Table 2)	21.8	17.8	39.6	45.0	36.8	81.8	45
River Training (Table 3)	14.6	3.6	18.2	30.0	7.5	37.5	20
Water Supply (Table 4)	10.0	8.1	18.1	20.6	16.8	37.4	45
Rural Telephones (Table 5)	6.1	6.1	12.2	12.6	12.5	25.1	50
Subtotal	52.5	35.6	88.1	108.2	73.6	181.8	40
Miscellaneous							
Technical Training	-	0.1	0.1	-	0.2	0.2	100
Project monitoring	0.1	-	0.1	0.1	-	0.1	0
Project evaluation	--	0.1	0.1	0.1	0.1	0.2	50
Subtotal	0.1	0.2	0.3	0.2	0.3	0.5	60
Total (baseline cost)	52.6	35.8	88.4	108.4	73.9	182.3	41
Physical contingencies							
Irrigation (13%)	2.5	2.5	5.0	5.2	5.2	10.4	50
River Training (10%)	1.5	0.4	1.9	3.1	0.8	3.9	20
Water Supply (10%)	1.0	0.8	1.8	2.1	1.7	3.8	45
Rural Telephones (10%)	0.6	0.6	1.2	1.3	1.2	2.5	50
Subtotal	5.6	4.3	9.9	11.7	8.9	20.6	43
Price contingencies							
Irrigation	5.8	4.4	10.2	12.0	9.0	21.0	43
River Training	0.8	0.2	1.0	1.6	0.4	2.0	20
Water Supply	1.4	1.2	2.6	2.9	2.4	5.3	45
Rural Telephones	0.1	0.2	0.3	0.3	0.3	0.6	50
Miscellaneous	0.1	--	0.1	0.1	0.1	0.2	50
Subtotal	8.2	6.0	14.2	16.9	12.2	29.1	42
Total project cost	66.4	46.1	112.5	137.0	95.0	232.0	41

KOREA

RURAL INFRASTRUCTURE PROJECT II

Cost Estimates: Irrigation Component
(1978 prices)

Item	Unit cost (W '000 per ha)	Number of subprojects	area (ha)	Total cost (W billion)	Total cost (US$ million)
A. Small Dam					
Dam	1,750				
Canals	805				
Relocation roads	195				
Conversion of uplands to paddies	365				
Materials: cement, steel, pumps & motors	235				
Land acquisition	800				
Survey and design /a	65				
Supervision /a	335				
Administration /b	115				
Subtotal	4,665	46	6,672	31.1	64.3
B. Pumping Station					
Pumping station	520				
Canals	1,270				
Relocation roads	20				
Conversion of uplands to paddies	295				
Materials: cement, steel, pumps & motors	335				
Land acquisition	260				
Survey and design /a	45				
Supervision /a	200				
Administration /b	65				
Subtotal	3,010	15	2,485	7.5	15.5
Total - Irrigation Works	.	61	9,157	38.6	79.8
C. Access Roads /b	LS	.	.	1.0	2.0
Total		61	9,157	39.6	81.8

/a To be paid to ADC.

/b To be paid to the FLIAs.

ANNEX 2
Table 3

KOREA

RURAL INFRASTRUCTURE PROJECT II

Cost Estimates: River Training Component
(1978 prices)

A. COST OF TYPICAL SUBPROJECT (W '000/km)

Item	Unit	Unit cost	River Class I Quantity	I Cost	III Quantity	III Cost
1. Stone pitching						
Embankment construction	cu m	0.25-0.4	2,500	637	6,000	2,400
Supply & delivery of stone	sq m	1.1 -1.8	1,800	3,240	3,600	3,944
Collection of gravel	man-day	1.1 -1.4	590	817	1,180	1,274
Stone mason	man-day	2.9	180	520	180	520
Labor	man-day	1.5	180	270	180	270
Cutting sod	man-day	1.5	90	135	90	135
Transporting sod	sq m	0.015	3,300	51	7,700	120
Sodding	man-day	1.5	210	315	210	315
Design, supervision & miscellaneous	.	LS	.	315	.	472
Total				6,300		9,450

Item	Unit	Unit cost	River Class II Quantity	II Cost	III Quantity	III Cost
2. Gabions						
Embankment construction	cu m	0.25-0.4	4,500	1,147	6,000	2,400
Transporting wire cylinders	kg	0 02	2,040	40	2,720	54
Constructing gabions	sq m	0.95	3,000	2,835	4,000	3,780
Collection of gravel	cu m	1.1	1,260	1,354	1,140	1,229
Tying of gabions	man-day	1.5	90	135	90	135
Backfilling	man-day	1.5	540	810	540	810
Cutting sod	man-day	1.5	90	135	90	135
Transporting sod	sq m	0.015	4,400	69	7,700	120
Sodding	man-day	1.5	210	315	210	315
Design, supervision & miscellaneous	.	LS	.	360	.	472
Total				7,200		9,450

B. COST OF RIVER TRAINING COMPONENT

River Class	Length (km)	Unit cost (W '000/km)	Cost (W billion)
I	1,250	6,300	7.88
II	750	7,200	5.40
III	500	9,450	4.72
Total - Construction	2,500		18.00

C. VEHICLES AND EQUIPMENT

Item	Quantity	Unit price (W '000)	Cost (W million)	
Theodolite	168	600	101	
Level	168	500	84	
Field vehicle	9	2,200	20	
Motorcycle	150	160	24	
Subtotal				0.23
Total				18.23

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RURAL INFRASTRUCTURE PROJECT II

Cost Estimates: Water Supply Component
(1978 prices)

Cost of a Typical System (1978)

Item	Cost (W'000)
Materials	
Pipe	620
Fittings	120
Electric and hydro-pneumatic pumps	265
Cement	275
Steel	265
Chlorinator	120
Timber	60
Transport	100
Skilled labor	475
Total	2,300

Note: The cost of a system is assumed to increase 5% per year as a result of more complex subprojects being undertaken.

Cost of Water Supply Component

Construction

	1978	1979	1980	Total
Unit cost (Won '000/system)	2,300	2,400	2,530	.
Number of systems	1,610	2,600	3,190	7,400
Total cost (Won million)	3.7	6.2	8.1	18.0

Vehicles

Item	Quantity	Unit price (W'000)	Cost (W million)	Total
Field vehicle	9	2,200	20	
Motorcycle	150	160	24	
Subtotal				0.1
Total				18.1

ANNEX 2
Table 5

KOREA

RURAL INFRASTRUCTURE PROJECT II

Cost Estimates: Rural Telephones Component
(1978 prices)

Item	Cost (W million)
Major Materials /a	
Telephone sets	
Cables	
Copper wire	5,300
Minor Materials /a	
Magneto boards	
Common battery board parts	
Distribution and terminal boxes	
Jointing materials	
Steel wires	
Concrete poles	
Switchboard cable and wires	2,120
Miscellaneous Supplies /a	1,450
Installation	
Equipment installation	
Cable laying	
Village line installation	3,230
Total - construction	12,100
Vehicles - field vehicles (9)	20
- motorcycles (150)	30
Total	12,150

/a Details in Working Paper No. C-4.

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RURAL INFRASTRUCTURE PROJECT II

Summary of Vehicles, Equipment and Materials
(US$ million) /a

Component	Procurement subject to: International Competitive Bidding (ICB)	Local Competitive Bidding (LCB)	Local Shopping (LSH)
Irrigation			
Equipment	1.10	-	-
Materials	3.96	-	-
River Training			
Vehicles	0.91	-	-
Equipment	0.38	-	-
Materials	-	-	13.81
Water Supply			
Vehicles	0.91	-	-
Equipment	4.04	1.92	-
Materials	9.93	-	11.53
Rural Telephones			
Vehicles	0.91	-	-
Equipment and materials	10.93	4.37	2.96
Total	33.07	6.29	28.30

/a Base costs - without contingencies.

ANNEX 2
Table 7

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RURAL INFRASTRUCTURE PROJECT II

Schedule of Expenditures

Item	Total cost	Calendar years 1978	1979	1980	1981	1982
	Won billion					
Irrigation	39.6	0.4	9.9	15.8	11.5	2.0
River Training	18.2	9.2	9.0	-	-	-
Water Supply	18.1	3.8	6.2	8.1	-	-
Rural Telephones	12.2	9.6	2.6	-	-	-
Miscellaneous	0.3	0.1	0.1	--	0.1	--
Total (baseline cost)	88.4	23.1	27.8	23.9	11.6	2.0
Physical contingencies						
Irrigation	5.0	--	1.3	2.0	1.5	0.2
River Training	1.9	1.0	0.9	-	-	-
Water Supply	1.8	0.4	0.6	0.8	-	-
Rural Telephones	1.2	1.0	0.2	-	-	-
Subtotal	9.9	2.4	3.0	2.8	1.5	0.2
Total (including physical contingencies)	98.3	25.5	30.8	26.7	13.1	2.2
Price contingencies						
Annual rate (%)	.	-	10	10	10	10
Compounded rate (%)	14	-	10	21	33	46
Amount (Won billion)						
Irrigation	10.2	-	1.1	3.8	4.3	1.0
River Training	1.0	-	1.0	-	-	-
Water Supply	2.6	-	0.7	1.9	-	-
Rural Telephones	0.3	-	0.3	-	-	-
Miscellaneous	0.1	-	--	--	0.1	--
Subtotal	14.2	-	3.1	5.7	4.4	1.0
Total project cost (Won billion)	112.5	25.5	33.9	32.4	17.5	3.2
(US$ million)	232.0	52.6	69.9	66.8	36.1	6.6

KOREA

RURAL INFRASTRUCTURE PROJECT II

Proposed Allocation of the Proceeds of the Loan

Category	Description	Estimated total cost (US$ million)	Proposed allocation (US$ million)		Disbursement %
Civil Works and Materials and Equipment Procured under Local Procedures					
(1)	Irrigation				
	Base cost	81.8			
	Price contingency	21.0			
	Subtotal	102.8			
	Less: Materials subject to ICB	5.1			
	Price contingency	1.3			
	Subtotal		96.4	37.5	40 /a
(2)	River Training				
	Base cost	37.5			
	Price contingency	2.0			
	Subtotal	39.5			
	Less: Vehicles and equipment	0.5			
	Subtotal		39.0	11.5	30 /a
(3)	Water Supply				
	Base cost	37.4			
	Price contingency	5.3			
	Subtotal	42.7			
	Less: Vehicles	0.2			
	Materials subject to ICB	14.4			
	Price contingency	2.0			
	Subtotal		26.1	6.0	25 /a
(4)	Rural Telephones				
	Base cost	25.1			
	Price contingency	0.6			
	Subtotal	25.7			
	Less: Vehicles	0.2			
	Materials subject to ICB	10.9			
	Price contingency	0.3			
	Subtotal		14.3	1.5	10 /a
	Subtotal (carried forward)		175.8	56.5	

Category	Description	Estimated total cost	Proposed allocation	Disbursement %
		------- US$ million ------		
	Subtotal (carried forward)	175.8	56.5	
Materials, Equipment and Vehicles Subject to ICB				
(5)	for Irrigation	6.4	6.1	100 /b
(6)	for River Training	0.5	0.45	100 /b
(7)	for Water Supply	16.6	15.8	100 /b
(8)	for Rural Telephones	11.4	10.8	100 /b
(9)	Training	0.2	0.2	100 /b
(10)	Project Evaluation			
	Base cost	0.2		
	Price contingency	0.1		
	Subtotal	0.3	0.15	50
(11)	Unallocated			
	Project monitoring	0.1		
	Price contingency	0.1		
	Physical contingencies	20.6		
	Subtotal	20.8	5.0	-
	Total	232.0	95.0	

Summary of Allocation of Loan by Components

Irrigation	43.6
River Training	11.95
Water Supply	21.8
Rural Telephones	12.3
Miscellaneous	0.35
Unallocated	5.0
Total	95.0

/a Percentage of total cost, including design and supervision costs, land acquisition, and equipment installation but excluding volunteer labor.

/b Percentage of c.i.f. cost of imported goods or ex-factory price of locally manufactured goods.

KOREA

RURAL INFRASTRUCTURE PROJECT II

Estimated Schedule of Disbursements

Bank fiscal year and quarter	Cumulative disbursements (US$ million equivalent)
1978	
3rd	-
4th	2.0
1979	
1st	8.5
2nd	16.3
3rd	22.8
4th	27.3
1980	
1st	36.3
2nd	42.3
3rd	47.8
4th	54.0
1981	
1st	64.5
2nd	71.5
3rd	77.5
4th	80.0
1982	
1st	85.0
2nd	89.0
3rd	92.0
4th	93.5
1983	
1st	94.0
2nd	94.5
3rd	94.8
4th	95.0

Closing date: June 30, 1983

KOREA

RURAL INFRASTRUCTURE PROJECT II

River Training Component: Financing Plan

1. The cost estimate for the component is shown in Annex 2, Table 3. The cost estimate assumes a value of unskilled labor of Won 1,500/man-day, which is considerably below normal wage rates in the farming season but does correspond to the actual wage paid to villagers under the program.

2. Funds for the program would come 60% from the Central Government budget (partly reimbursed by the Bank), 30% from the provincial budgets (under a revenue sharing plan) and 10% from the villagers. The village contribution would normally be in the form of volunteer labor but might take other forms, such as local materials or cash from the Village Development Fund, as circumstances permit. The government assistance is allocated to the county chiefs at the beginning of the fiscal year. The county chief transfers the allocation for each subproject to an account in the name of the Village Development Committee. Withdrawal of these funds requires the signatures of three persons: the village Saemaeul leader (an elected position); the village headman (an appointed semi-governmental position); and the subdistrict chief (a civil servant).

3. The village develpment committee is allowed considerable latitude in the use of the government grant. A certain amount must be earmarked for materials, skilled labor and equipment but these costs are usually only about half the total cost. The remainder may be used to pay unskilled labor. However, MHA prefers that only "needy" people be paid and that all others volunteer their labor. The "core" group of needy people are defined by the Living Protection Law (No. 913 of 1961) as falling into one of the following groups:

(a) Persons older than 65 years and without family;

(b) Persons younger than 18 years and without family;

(c) Pregnant housewives without support;

(d) Disabled persons; and

(e) Persons made eligible under other laws.

These groups are entitled to Government food subsidies, medical treatment and various other benefits. For the purpose of the River Training component (and some other similar programs), the village is entitled to add other categories of needy people, using more flexible criteria, usually:

(f) Families with less than 0.3 ha of land;

(g) Non-farm families; and

(h) Others who cannot support themselves (usually defined as a family income of less than Won 22,000 (US$45) per month).

In any case, "needy people" appear to be a well-defined group, typically accounting for 10-15% of the village population. This group also corresponds closely with the target group of the absolute poor, who are estimated to number about 14% of the rural population.

4. Needy people are entitled to wages of W 1,500/day (W 1,000/day for women) but MHA encourages them to return up to half their earnings to the Village Development Fund. Thus in a "model" village, a considerable amount of the govenment grant would be retained in the Village Development Fund and used for approved projects to increase income, for example, livestock raising, cash crops or cottage industries. The income-raising projects to be supported are listed in the application for assistance in River Training.

5. It is understood that the degree of adherence to the "model" financing plan varies widely, according to the village's relative poverty, previous exprience under the Saemaeul Movement and its degree of self-reliance. This degree of flexibility (unusual in Korea) appears a very appropriate response to these varied conditions. In 1977, 6% of the total program cost was deposited in the Village Development Fund and 2% was contributed as volunteer labor. MHA has projected that the proportion deposited will increase to 8% in 1978 and 10% in 1979.

6. The actual sources and application of funds for the 1977 program are shown in Table 1. Funds were obtained 98% from Government sources - this will be reduced to 90% for the project period. Funds were expended roughly 50% for unskilled labor, 25% for materials, and the remainder for equipment (trucks for transporting materials and bulldozers for forming the larger embankments) and skilled labor (such as stone masons).

7. The actual use of the Village Development Funds in 1977 is shown in Table 2. Funds available averaged W 226,000 (US$465) per village. About half the funds were loaned to individuals for livestock purchase, about 15% was saved for future projects and the remainder was spent on a variety of infrastructural and income producing projects.

8. Land reclaimed under River Training subprojects remains the common property of the village and is registered as such. It may be leased to individuals and the income added to the Village Development Fund.

9. Government funds allocated to these projects are not repaid. This is reasonable, as the relatively modest amounts involved (about US$4,000/village) serve three objectives:

(a) River Training - creating new cropland and protecting existing cropland and structures from flooding.

(b) Income projects - which also add to production and create additional employment. These funds are repaid to the village by the individual beneficiaries.

(c) Social welfare - additional income for needy people.

10. The above arrangements are satisfactory, though they are different from the financing plans of all the components of Rural Infrastrucure I. Sufficient safeguards against the misuse of funds exist and these would be supplemented by spot-checking and independent auditing under the project.

11. Bank funds would be disbursed to Korea on the basis of quarterly reports of actual work completed (as is done for several components of Stage I), whereas the government funds could continue to be paid in advance to the villages. The only feasible form of procurement for the cement, stone, and other materials needed for the component would be local shopping.

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RURAL INFRASTRUCTURE PROJECT II

River Training Component: Financing Plan - 1977 Program

Sources of funds	Amount (W million)	%
Central Government	134	9
Revenue sharing	502	35
Local Government	774	54
Subtotal: Government	1,410	98
Village - cash	4	--
- labor	29	2
Subtotal village	33	2
Total	1,443	100

Application of funds	Amount (W million)	%
Materials	355	25
Equipment operation	73	5
Skilled labor (10,000 man-days)	250	17
Unskilled labor - needy people (49,000 man-days)	732}/a	51
- others (2,000 man-days)	33}	2
Total	1,443	100

/a Of which W 87 million (6% of total project cost) was returned to the Village Development Fund.

ANNEX 3
Table 2

KOREA

RURAL INFRASTRUCTURE PROJECT II

River Training Component: Uses of Village Development Funds - 1977

No. of villages participating: 593
Amount in fund at beginning of program: W 47 million
Amount deposited as a result of the River Training Program: W 87 million
Amount available for income projects: W 135 million

ACTUAL OR PLANNED USE OF FUNDS

Type of project	No. of villages	Amount (W million)
Animal husbandry	356	75.3
Public welfare facilities	35	7.0
Additional river training	38	6.0
Roads and bridges	5	6.9
Cash crops	2	3.4
Repair of roads	5	2.4
Public facilities	17	4.9
Farmland formation	8	2.0
Tree planting	10	1.9
Irrigation	9	1.4
Electrification	2	1.3
Water supply	2	0.5
Environmental improvement	2	0.4
Farm machinery	2	0.3
Fisheries	1	0.3
Subtotal	494	114.0
Retained in village development fund for future projects	99	20.6
Total	593	134.6

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RURAL INFRASTRUCTURE PROJECT II

Project Initiation Plan

Activity	Responsibility	Critical Date
Subproject Selection /a		
1. Irrigation	MAF	Completed
2. River Training	MHA, provinces	February 1978
3. Water Supply	MHSA, provinces	February 1978
4. Rural Telephones	MCM	Completed
Completion of Design		
1. Irrigation	ADC	December 1978
2. River Training	Counties	April 1978
3. Water Supply	Counties	March 1978
4. Rural Telephones	MCM	Completed
Procurement		
A. Subject to ICB (critical items only)		
1. Translate specifications	MHSA/MCM	Completed
2. Advertize bids	OSROK	Dec. 1977/Feb. 1978
3. Evaluate bids and award contract	OSROK	March/April 1978
4. Receive goods /b	MHSA, MCM, others	April/May 1978
B. Subject to LCB		
1. Advertize bids	OSROK	February 1978
2. Receive goods	All executing agencies	April 1978

/a Whole program for irrigation component; 1978 program for other components.

/b Goods not available at the start of the 1978 construction season would be borrowed from stock.

C. Civil Works		
1. National Prequalification	ADC	April 1978
2. Advertise bids	FLIAs	May 1978-April 1979
3. Award contracts	FLIAs	May 1978-May 1979
Irrigation Development		
1. Submit proposal for minimizing cost increases	MAF	Completed
2. Prepare proposals for dam safety inspections	MAF/ADC	June 30, 1979
3. Appointment of additional extension agents	ORD/FLIAs	December 31, 1978
Project Monitoring		
1. Submission of first quarterly report		
- from Ministries	MAF/MHA/MHSA/MCM	April 30, 1978
- from EPB to Bank	EPB	May 31, 1978
Project Auditing		
1. Submission of name and qualifications of proposed auditor	EPB	September 30, 1978
2. Submission of audit report	Auditor/EPB	April 30, 1979
Project Evaluation		
1. Submission of program for continuing studies	EPB	October 1, 1978

KOREA

RURAL INFRASTRUCTURE PROJECT II

List of Key Indicators

The targets shown below should allow comparison between appraisal projections and actual achievements, in a concise and easily-comprehensible form.

	Activity	Total	Unit	Planned Target for 1978 June 30	1978 Dec. 31	1979 June 30	1979 Dec. 31	1980 June 30	1980 Dec. 31	1981 June 30	1981 Dec. 31	1982 June 30
A.	Irrigation Component											
1.	Subproject selection	61	each	61	61	61	61	61	61	61	61	61
2.	Survey and design	61	each	35	61	61	61	61	61	61	61	61
3.	Award contract	61	each	15	15	61	61	61	61	61	61	61
4.	Complete subproject	61	each	-	-	-	-	5	10	30	45	61
5.	Area irrigated	9.2	'000 ha	-	-	-	-	-	0.7	2.0	4.0	9.2
B.	River Training Component											
1.	Subproject selection	8,300	each	4,150	4,150	8,300	8,300	.	.	.	.	.
2.	Subprojects completed	8,300	each	1,000	4,150	5,150	8,300	.	.	.	.	.
C.	Water Supply Component											
1.	Subproject selection	7,400	each	1,610	1,610	4,210	4,210	7,400	7,400	.	.	.
2.	Subprojects completed	7,400	each	500	1,610	2,400	4,210	5,200	7,400	.	.	.
3.	Households served	592	'000	40	129	200	337	420	592	.	.	.
D.	Rural Telephones Component											
1.	Village lines completed	2,704	each	800	2,704	.	.	.	.	.	.	.
2.	Subscribers' lines completed	75	'000	10	36	48	75	.	.	.	.	.
E.	Project Evaluation											
1.	Implementation of study	100	%	10	25	37	50	62	75	87	100	.

ANNEX 4
Table 2

ANNEX 5
Table 1

KOREA

RURAL INFRASTRUCTURE PROJECT II

Price Structure for Rice /a
(W'000/ton, milled basis)

		1978		1985	
		Financial	Economic	Financial	Economic
Thai 5% broken f.o.b. Bangkok /b	(US$/ton)	330	330	420	420
Ocean freight and insurance	(US$/ton)	30	30	33	33
Import price c.i.f. Incheon/Busan	(US$/ton)	360	360	453	453
Won equivalent import price @ W 485 = US$1.00		174,600	174,600	219,705	219,705
Internal transportation, storage and handling /d		18,790	15,970/c	20,670	17,570/c
Cost of milling		8,000	6,800/c	8,800	7,480/c
Price of rice, project area		185,390	183,770	231,575	229,795
Price subsidy		162,235	-	116,050	-
Farm-gate price of rice		347,625	183,770	347,625	229,795
Value of byproducts (bran and straw)		39,400	33,490/c	43,340	36,840/c
Farm-gate value of rice		387,025	217,260	390,965	266,635

/a In terms of 1978 constant prices.

/b Most of Korea's rice imports are of US origin and are equivalent to or better in quality than Thai 5% broken.

/c Using the standard conversion factor for Korea of 0.85, implying a shadow exchange rate of W 570 = US$1.00.

/d As relative prices continue to change over time, a 10% increase in real cost between 1978 and 1985 is assumed.

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RURAL INFRASTRUCTURE PROJECT II

Farm Input and Output Prices
(W'000 per ton)

	1978		1985	
	Financial	Economic	Financial	Economic
Crops				
Rice	387	217	391	267
Barley	168	148	170	160
Soybean	279	129	335	155
Sweet potato	87	75	92	79
Chinese cabbage	39	33	41	34
Garlic	1,178	1,000	1,234	1,050
Red pepper	1,027	874	1,078	917
White potato	109	92	114	97
Sesame	861	733	904	769
Tobacco	670	569	704	598
Onion	88	75	92	79
Fertilizers				
Nitrogen	279	190	367	250
Phosphoric acid	229	155	319	216
Potassium	112	76	128	86
Compost	3	2	3	2
Seeds				
Rice	271	153	274	187
Barley	126	112	128	120
Soybean	223	180	268	216
Sweet potato	74	64	78	67
Chinese cabbage	79,950	79,458	84,050	82,964
Garlic	1,885	1,605	1,975	1,685
Red pepper	23,620	20,091	24,795	21,095
White potato	165	138	171	146
Sesame	865	844	910	885
Tobacco	53,600	45,560	56,320	47,875
Onion	3,080	2,592	3,240	2,711

Source: Working Paper No. C-5.

KOREA

RURAL INFRASTRUCTURE PROJECT II

Irrigation Component: Crop Budgets and Net Value of Production

	Area (ha)	Yield (ton/ha)	Production ('000 ton)	Economic farm-gate price (W '000/ton)	Gross value of production	Production costs /a (W '000/ha)	Net value of production /a	Total NVP for project area	Value of labor W billion	Net value of production
Future Without Project										
Improved rice	3,776	4.0	15,100	267	1,068	211	857	3.23		
Traditional rice	2,763	3.0	8,300	267	801	187	614	1.69		
Barley	4,268	2.0	8,500	160	320	151	169	0.72		
Garlic	120	4.3	520	1,050	4,515	1,890	2,625	0.32		
White potato	82	10.5	860	97	1,020	313	707	0.06		
Onion	-	.	-	.	-	.	.	-		
Other upland crops	2,563	.	.	.	.	.	.	1.27		
Total								7.29	3.87	3.42
Future With Project	13,572									
Improved rice	7,825	5.0	39,100	267	1,335	248	1,087	8.51		
Traditional rice	1,295	4.0	5,200	267	1,068	224	844	1.09		
Barley	6,667	2.8	18,700	160	448	192	256	1.71		
Garlic	146	6.8	990	1,050	7,174	1,890	5,284	0.77		
White potato	246	14.3	3,500	97	1,387	381	1,006	0.25		
Onion	137	24.0	3,300	79	1,896	305	1,591	0.22		
Other upland crops	-	.	.	.	.	.	.	-		
Total	16,316							12.55	4.06	8.49
Increment due to project	2,744									5.07 (US$10.5 mil.)

/a Excluding labor.

ANNEX 5
Table 3

KOREA

RURAL INFRASTRUCTURE PROJECT II

Irrigation Component: Benefited Area Farm Income Statement
(Won '000)

	0.12 ha farm size /a			0.35 ha farm size /a			1.05 ha farm size /a		
	Present situation	Future without project	Future with project	Present situation	Future without project	Future with project	Present situation	Future without project	Future with project
Gross value of production	165	176	303	482	514	882	1,447	1,533	2,657
Nonlabor production inputs costs	34	42	61	98	122	178	299	363	538
Hire labor /b	-	-	-	-	-	-	93	98	131
Gross project area income	131	134	242	384	392	704	1,055	1,072	1,988
Taxes /c	1	1	2	5	5	9	27	28	52
Interest charges /d	1	1	1	2	2	3	8	9	13
Water charges /e	0	0	16	0	0	47	0	0	143
Net farm income	129	132	223	377	385	645	1,020	1,035	1,780

/a Average farm sizes benefited by the project. Average total farm sizes are: 0.35; 1.0 ha and 3.0 ha.

/b Based on family labor of full-time adult equivalents or 1.9 for an average farm size of less than 0.5 ha, 2.6 for an average farm size of 1.0 ha and 3.0 for an average farm size of greater than 2.0 ha (see MAF, Farm Household Economy Survey, 1977).

/c Taxes on agricultural income: 1.0% on less than 0.5 ha farm size, 1.3% on 1.0 ha farm size and 2.9% on greater than 3.0 farm size (see the above source).

/d Assumed that 30% of the entire inputs costs are borrowed for six months at an interest rate of 13% per annum.

/e Operations and maintenance costs plus 30% of capital costs at 3.5% interest per annum for 35 years with a five year grace period.

ANNEX 5
Table 4

KOREA

RURAL INFRASTRUCTURE PROJECT II

Irrigation Component: Farm Household Income Statements
(Won '000)

	0.35 ha farm size /a			1.0 ha farm size /a			3.0 ha farm size /a		
	Present situation	Future without project	Future with project	Present situation	Future without project	Future with project	Present situation	Future without project	Future with project
Project benefited area net income /b	129	132	223	377	385	645	1,020	1,035	1,780
Outside project area net income /c	77	79	79	188	193	193	408	414	414
Total net farm income	206	211	302	565	578	838	1,428	1,449	2,194
Total net nonfarm income /d	159	162	233	124	127	184	195	197	299
Total net farm household income	365	373	535	689	705	1,022	1,623	1,646	2,493
Net per capita income /e	78.3	80.0	114.8	121.5	124.3	180.2	243.7	247.1	374.3

/a Average total farm sizes equal project benefited area plus area outside the project.

/b See Table 3.

/c Net income from the project-unaffected areas which constitute almost twice the project-benefited are: 60% for the smaller farm size, 50% for medium farm size and 40% for larger farm size. Future net income of the project-unaffected areas remains unchanged without the project and with the project.

/d For smallest farm size 43.5%, for medium farm size 18% and for largest farm size 12% of farm income (see MAF, Farm Household Economy Survey, 1977).

/e 4.66 members in smallest farm size, 5.67 members in medium farm size family and 6.66 members in largest farm size family (see above reference).

KOREA

RURAL INFRASTRUCTURE PROJECT II

Additional Documents and Data Available in the Project File

Section A: General Reports on Korea and the Rural Sector

Reference No.	
A - 1	World Bank, "Growth and Prospects of the Korean Economy," Report No. 1489-KO, February 23, 1977 (12 vols) - Annex A, "Agriculture".
A - 2	Economic Planning Board, "Major Statistics of Korean Economy: 1977," Seoul, Korea.
A - 5	Ministry of Finance, "Brief Korean Taxation," Seoul, Korea, March 1977.
A - 6	Ministry of Agriculture and Fisheries, "Yearbook of Agriculture and Forestry Statistics: 1976," Seoul, Korea, November 1976.
A - 7	National Agricultural Cooperative Federation," Monthly Review: 7-77", Suweon, Korea, July 1977.
A - 8	World Bank, "Price Prospects for Major Primary Commodities," Report No. 814/77, June 1977.
A - 9	Economic Planning Board, "Annual Report on the Price Survey: 1975," Seoul, Korea, July 31, 1976.
A -10	Economic Planning Board, "The Price Stabilization and Fair Trade Act," Seoul, Korea, December 31, 1975.

Section B: General Reports and Studies Relating to the Project

General

B - 1	World Bank; "Korea - Appraisal of the Rural Infrastructure Project," Report No. 958a-KO, February 15, 1976.
B - 2	Korea Overseas Information Service, "Saemaul Undong," Korea Background Series, 1977.

Irrigation Component

B - 3 Agricultural Development Corporation, "Agricultural Development Corporation," Anyang, Korea (no date). (General Information on ADC)

B - 4 Ministry of Agriculture and Fisheries," Proposed Project Area on 2nd IBRD Loan Project (Draft)," April 1977. (Subproject Selection Data)

B - 5 Agricultural Development Corporation, "Second IBRD Loan Sub-Projects (Draft)," August 9, 1977. (Design Data and Costs)

B - 6 Agricultural Development Corporation, "Second IBRD Loan Sub-Projects: Area of Minor Irrigation Development (Draft)," August 1977. (More Detailed Design Data and Costs)

B - 7 Agricultural Development Corporation, "Economic Analysis for Sub-Project Areas of Minor Irrigation Development," August 1977. (Detailed Calculations for Six Subprojects)

B - 7a Agricultural Development Corporation, "Rural Infrastructure Project II: Irrigation Component (Draft)," January 1978. (Revised design data and costs).

B - 7b Agricultural Development Corporation, Cost Comparisons and/or Economic Evaluations for Fifteen Subprojects.

B - 7c Agricultural Development Corporation, Detailed Design Calculations, Cost Estimates and Drawings for the Ha Bun and Sam Pae Subprojects (4 Volumes), November 1977.

B - 7d Ministry of Agriculture and Fisheries, "Rural Infrastructure Project II: Loan Negotiation Draft (Irrigation Component)," January 1978. (Revised cost estimate, bidding procedures, budget construction schedule, training and cost cutting proposals).

River Training Component

B - 8 Ministry of Home Affairs, "River Training Programme in Korea," (April 1977). (Project Background and Project Management)

B - 9 Ministry of Home Affairs, "IBRD Loaned River Training Project," (August 1977). (Cost Estimate, Materials List and Benefit Data)

B -10 Ministry of Home Affairs, "Second Rural Infrastructure Project (River Training Project)," (August 1977). (Information on Construction Methods and Project Organization)

B -11 Ministry of Construction, "Practical Summary as to Technology for River Improvement," Training Institute, 1971 - Translation of Chapters 1 and 2. (Hydrologic and Hydraulic Design Methods)

B -12 Sample design, contract document and drawings for Whaebu Sub-project, Chungcheong Nam Province.

B -13 Sample "Registration Card of Income-Generating River Training Program" and "Final Report of River Training Program for Income Generation" (translated).

B -13a Ministry of Home Affairs, "River Training Project: Revetment Design Method," undated. (Detailed design and construction methods for all masonry bank protection systems.)

Water Supply Component

Rural Telephones Component

B -14 Ministry of Communications, "Telecommunications in Korea," (no date). (General Information on MCM)

B -15 Ministry of Communications, "Telecommunications in the Republic of Korea," February 1977. (Statistical Summary)

B -16 Ministry of Communications, "Statistical Yearbook of Communications, 1976," (no date).

B -17 Ministry of Communications, "Comparative Balance Sheet - Special Account," (July 1977).

B -18 Ministry of Communications," Preliminary Loan Application to IBRD Fund (Rural Telecommunication Project)," April 1977. (Summary of Project Proposal)

B -19 Ministry of Communications, "Rural Telephone Component: Additional Data," (July 1977). (More Detailed Information on Cost Estimates, Materials List and Financial Analysis)

Project Evaluation

B -20 EPB/NAERI, "Research Program for the Evaluation Study of Rural Infrastructure Development Projects under the IBRD Loan," Seoul, Korea, March 1977. (Study Organization and Plan of Work)

B -21 Korea Development Institute, "Saemaeul Undong (The New Community Movement in Korea): Working Paper," Sung Hwan Ban, February 1977.

Section C: Selected Working Papers

C - 1*	Working Paper on the Irrigation Component.
C - 2*	Working Paper on the River Training Component.
C - 3*	Working Paper on the Water Supply Component.
C - 4*	Working Paper on the Rural Telephones Component.
C - 5*	Working Paper on the Economic Evaluation of the Irrigation Component.
C - 6*	Working Paper on the Economic Evaluation of the River Training Component.
C - 7*	Working Paper on the Economic and Financial Evaluation of the Rural Telephones Component.
C - 8	"Development of Rural Telecommunications, Republic of Korea," September 1977.
C - 9	"Background Papers on Korean Telecommunications," (September 1977).
C -10	Economic Evaluation of the Irrigation Component - Computer Printout.

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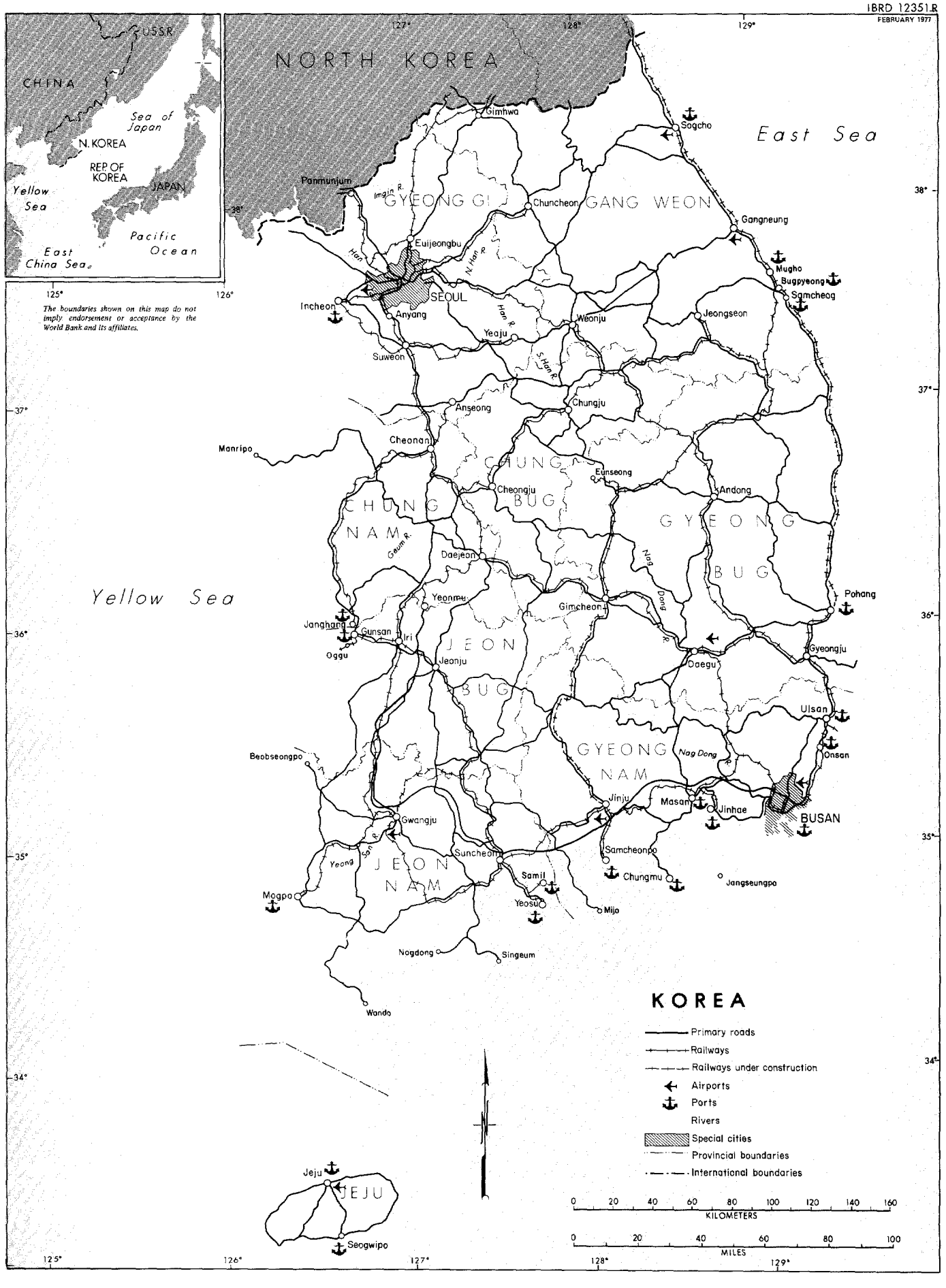
* Included in the Supplementary Volume of Major Working Papers, which is available on request.

IBRD 12351.R
FEBRUARY 1977



The boundaries shown on this map do not imply endorsement or acceptance by the World Bank and its affiliates.

KOREA

- Primary roads
- Railways
- Railways under construction
- Airports
- Ports
- Rivers
- Special cities
- Provincial boundaries
- International boundaries

0 20 40 60 80 100 120 140 160 KILOMETERS

0 20 40 60 80 100 MILES